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ROYAL SOCIETY
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TASMANIA

PAPERS & PROCEEDINGS

OF THE

ROYAL SOCIETY

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FOR THE YEAR

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THE ROYAL SOCIETY OF TASMANIA.

The Royal Society of Tasmania was founded on the 14th October, 1843, by His Excellency Sir John Eardley Eardley Wilmot, Lieutenant Governor of Van Diemen's Land, as "The Botanical and Horticultural Society of Van Diemen's Land." The Botanical Gardens in the Queen's Domain, near Hobart, were shortly afterwards placed under its management, and a grant of £400 a year towards their maintenance was made by the Government. In 1844, His Excellency announced to the Society that Her Majesty the Queen had signified her consent to become its patron; and that its designation should thenceforward be "The Royal Society of Van Diemen's Land for Horticulture, Botany, and the Advancement of Science."

In 1848 the Society established the Tasmanian Museum; and in 1849 it commenced the publication of its "Papers and Proceedings."

In 1854 the Legislative Council of Tasmania by "The Royal Society Act" made provision for vesting the property of the Society in trustees, and for other matters connected with the management of its affairs.

In 1855 the name of the Colony was changed to Tasmania, and the Society then became "The Royal Society of Tasmania for Horticulture, Botany and the Advancement of Science."

In 1860 a piece of ground at the corner of Argyle and Macquarie streets, Hobart, was given by the Crown to the Society as a site for a Museum, and a grant of £3,000 was made for the erection of a building. The Society contributed £1,800 towards the cost, and the new Museum was finished in 1862.

In 1885 the Society gave back to the Crown the Botanical Gardens and the Museum which, with the collections of the Museum, were vested in a body of trustees, of whom six are chosen from the Society. In consideration of the services it had rendered in the promotion of science, and in the formation and management of the Museum and Gardens, the right was reserved to the Society to have exclusive possession of sufficient and convenient rooms in the Museum, for the safe custody of its Library, and for its meetings, and for all other purposes connected with it.

In 1911 the Parliament of Tasmania, by "The Royal Society Act, 1911," created the Society a body corporate by the name of "The Royal Society of Tasmania," with perpetual succession.

The object of the Society is declared by its Rules to be "the advancement of knowledge."

His Majesty the King is Patron of the Society; and His Excellency the Governor of Tasmania is President.

ROYAL SOCIETY OF TASMANIA

PAPERS AND PROCEEDINGS, 1919

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PAPERS
OF THE
ROYAL SOCIETY OF TASMANIA
1919

STUDIES OF TASMANIAN CETACEA.

Part I.

(*Orca gladiator, Pseudorca crassidens, Globicephalus melas*)

By

H. H. Scott, Curator of the Victoria Museum, Launceston,

and

Clive E. Lord, Curator of the Tasmanian Museum, Hobart.

Plates I.-IX.

(Received 17th March, 1919. Read 14th April, 1919.)

PRELIMINARY.

As the present paper is the outcome, in the main, of presentations made to scientific societies by one who was intimately connected with the Tasmanian whaling industry, it has been thought fit to commence with a brief historical review of this interesting period. Also, in view of the fact that this paper is intended to serve as an introduction to further studies of the *Cetacea* which we hope to mutually conduct in the future as opportunities present themselves. The chief references in the accounts of the early voyages relate to the pursuit of the "black whale" (an unfortunate vernacular name at best). As far as Tasmania is concerned the industry began to assume commercial importance about the year 1818, and at that time it was no uncommon sight to see whale hunts in the Derwent. As the industry increased the whales were driven further afield, but they still continued to visit the coast at stated intervals. The season usually lasted from May, or June, until November, and as the men engaged in this branch of the industry formed small stations at the coastal bays and there awaited the whales, this method of securing the cetaceans became known as "bay whaling."

There is one instance recorded of a female whale ascending the River Derwent as far as New Norfolk, 24 miles above Hobart, and being killed there (1).

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(1) Bischoff. Sketch History of V.D.L. (1832), p. 27.

Henderson, writing in 1832 (2), states that the "black whale" and the "black fish" are found on the Southern Coasts of N.S.W. "The latter are frequently observed "collected in shoals, at a great distance from any land, "lying motionless upon the surface, as if basking in the "sun beams; while the former resort, during their breeding "seasons, to the deep estuaries of rivers, and particular "bays around Van Diemen s Land, and Bass's Straits, "etc." (3).

The initial system of whaling was continued until 1841, when the "black whales" almost ceased to visit the coast. Attention was then paid to the sperm whales, which usually kept further out to sea as they passed from the westward—often followed by numbers of "black whales." Up till this period the system of ocean whaling had been carried on by vessels from overseas, but the Colony had now to provide its own whaling fleet if it was to derive any profit from the industry. The first of the Tasmanian fleet was the *Maria Orr*, built at Macquarie Point (River Derwent) in 1839. This vessel's career was a limited one as she was wrecked on the Actæons two years later.

As the industry increased, Hobart became a great refitting centre, and as many as thirty or forty whaling vessels have been in port at the same time. The refitting usually took considerable time owing to the lack of docking facilities and the old method of "heaving down" having to be resorted to. This trouble was overcome in 1854 by the erection of a patent slip at Battery Point (4).

In 1857 the late Dr. W. L. Crowther fitted out an expedition to whale in high southern latitudes, and Kerguelen Island was selected as a suitable locality, Captain Robinson being placed in command. His barque—*Offey*—was in charge of the expedition, but owing to the failure of the tenders (the brigantine *Flying Squirrel* and the schooner *Elizabeth Jane*) to keep him supplied with provisions, the venture was not very successful.

In 1860 there were about thirty vessels engaged in the Tasmanian whaling industry, but in ten years this number had diminished by half. In 1870 the rise in price of sperm oil to £120 per tun caused a revival, and many ships were fitted out. This revival lasted for about fifteen years, and then the decline commenced until in the early nineties the whaler *Waterwitch* was the sole vessel engaged.

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(2) Henderson. Observations on the Colonies of N.S.W. and V.D.L. (1832), p. 136.

(3) When Mr. Lord and a party were engaged in a collecting trip in D'Entrecasteaux Channel in November, 1916, a whale was noticed in shallow water in Ford Bay. Upon closer investigation it was found to be a female *Balænoptera* together with a calf.

(4) Erected by Mr. John Ross at Secheron. Afterwards removed by Mr. Ross in 1868, and subsequently purchased by Kennedy and Sons. Messrs. McGregor and Co. also laid down a slip at the Domain.

It is of interest to recall the fact that William Lanny ("King Billy"), the last Tasmanian male aboriginal, followed the calling of a whaler. He made his final voyage in the *Runnymede*, and was paid off on February 26th, 1869, and died a few days later (4a).

INTRODUCTION.

Students of the Tasmanian Cetacea have for many years been in search of some Tasmanian records relating to the munificent osteological presentations made to several English scientific institutions by the late Dr. W. L. Crowther. Since the year 1902 Mr. Scott has been working on the Tasmanian *Cetacea* (5), and has been most anxious to obtain Tasmanian records relating to the late Dr. Crowther's collections for the purpose of investigating the question of the comparative anatomy of certain species. Upon Mr. Lord's appointment as Curator of the Tasmanian Museum a thorough overhaul of the Museum store specimens was made with the result that a series of hitherto undescribed specimens were brought to light. As certain of these were undoubtedly portion of the Crowther collection a thorough investigation was decided upon. Upon this being made a considerable amount of interesting data was obtained, which appeared well worthy of being placed on record, and the following notes are therefore the result of our observations.

Between the years 1866 and 1871 the late Dr. W. L. Crowther, of Hobart, who was interested in the whaling industry, collected a large number of skeletal remains of various Tasmanian *Cetacea*, and presented them to several English Museums. Some of these specimens still claim folios in the Catalogues of the British Museum and the Royal College of Surgeons' Museum. Mr. Scott made an effort in 1902 to trace some of Dr. Crowther's specimens in the State, as he was then engaged in publishing a series of articles on this subject. At that time his inquiries did not meet with success, but the matter was always kept in mind. Owing to the recent revision of the Basement stores of the Tasmanian Museum some old boxes which had evidently been stored away from the time they were moved from the old Museum of the Royal Society to the present building

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(4a) Bonwick. The Last of the Tasmanians, p. 395.

(5) Scott, Launceston Courier, 1902. Scott. Notes on a fossil whale from Wynyard, Pap. and Proc. Roy. Soc. Tas., 1913, p. 167.

were discovered. These were found to contain interesting osteological specimens, the majority of which related to the Crowther presentations.

A rough examination disclosed that the collection consisted of three more or less complete skeletons probably relating to *Globicephalus*, the skull and portion of a skeleton of a killer whale. Also included there were two skeletons (without skulls) of the Dugong (*Halicore australis*). In addition to the foregoing a skull from the Museum store collection labelled "*Epidon chathamensis*" (6) was examined for purposes of comparison, and also an articulated skeleton of a "Killer," made in 1868, together with a larger skull.

When we recall the fact that the late Dr. W. L. Crowther from the year 1866 onward continued to collect and forward to the Museum of the Royal College of Surgeons a wonderful series of Cetacean remains—that in total embraced 34 Catalogue folios and in Classification 8 genera of whales—it would have been remarkable if he had not presented some specimens to the local Museum. The late Dr. Crowther's gifts to the greatest Museum of comparative anatomy in the world, included no less than 15 full skeletons of whales—splendidly prepared and ready for articulation upon arrival in England. The Tasmanian Scientific world seems to have largely lost sight of the enthusiasm thus manifested by one who lived and worked amongst us, and we wish to appreciatively recall Dr. Crowther's extensive and practical studies among the Tasmanian *Cetacea.*

Before concluding these introductory remarks it is of interest to note that Dr. Crowther forwarded from Tasmania to the Museum of the Royal College of Surgeons a representative of the genus *Clymenia*. As this species has not been placed on the Tasmanian list the donation by Dr. Crowther is worthy of attention, and efforts should be made to trace this species in Tasmanian seas. There is a chance, however, that the specimen forwarded to England may have been obtained by one of Dr. Crowther's whalers on the high seas many miles from Tasmania.

The particular species referred to is figured in the Zoology of the Voyage of the Erebus and Terror, Mammalia, Vol. I., Pl. 15, and is there designated *Delphinapterus peronii*. It is notable for the absence of the dorsal fin, and the fact that the beak, pectoral fins, and under part of the body are white.

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(6) Lord. Notes Mammals of Tasmania, P. and P. Roy. Soc. Tas., 1918, p. 29.

CONSPECTUS.

In the present instance our investigations extended to the following specimens of the Tasmanian Museum collections:—

1. One complete articulated skeleton which was labelled "Skeleton of Killer (*Orca pacifica*) from Adventure Bay, Tasmania. Prepared and articulated by T. Roblin, Curator of the Museum 1868."

2. One skull complete with lower jaw, which was labelled "*Pseudorca meridionals*, Donor, W. L. Crowther, Esqr."

This specimen was in a splendid state of preservation.

3. One skull, similar character to No. 2, but not in such a good state of preservation. The lower jaw and teeth are missing.

4. A large portion of the skeleton belonging to the previous skull.

5. Complete skeleton, including skull of *Globicephalus melas*. (Adult male.)

6. Ditto. (Immature male.)

7. Ditto. (Female—skull missing.)

8. Skull of *Globicephalus melas*.

9. Skull of Beaked whale labelled "*Epiodon chathamensis*."

In the present instance we have dealt with the first eight of this series, and it is our intention to consider the characteristics of the remainder in future papers, together with such facts relating to other members of the Tasmanian *Cetacea* as may be obtained from time to time.

PSEUDORCA CRASSIDENS

(Plate No. I.)

Phocaena crassidens, Owen, British Fossil Mammals and Birds, p. 516 (1846).

Pseudorca crassidens, Reinhardt, Recent Memoirs of Cetacea, Ray Society (Nov. 7th, 1862).

Orca meridionalis, Flower, Proc. Zoological Society of London, p. 420 (1864).

Attention was first paid to specimen No. 1, which consisted of a complete articulated skeleton bearing the label "Skeleton of Killer" (*Orca pacifica*) from Adventure Bay, Tasmania. (Prepared and Articulated by T. Roblin, Curator of the Museum 1868).

Upon a comparison being made of the two skulls (Specimens No. 2 and 3) with this articulated specimen, and an examination of the leading generic characters of both, it was resolved to make a rough comparison between this skeleton and the dimensions given in the original description (7) of the *Pseudorca crassidens* of Reinhardt. The results showed such a striking similarity between the two specimens that a series of comparative measurements were made, as shown in the following tables. These proved conclusively that the articulated skeleton was a good example of *Pseudorca crassidens*. As we know it came from Adventure Bay it is almost certain to be portion of the Crowther collection and to be one of the mixed school which came ashore there. It is known that the school consisted of representatives of the following species:—*Globicephalus melas*, *Orca gladiator*, and *Pseudorca crassidens*. At the time when these specimens were being prepared in Tasmania (the latter '60s) communication with the centres of scientific research was a matter of months and not of weeks as at the present day. We can well imagine that there was some confusion as regards the exact nomenclature of the species, not only on account of the difficulties of correspondence, but also on account of several specimens of different species being obtained from the same locality at the same time. Further, we must remember, that at the time when these specimens were collected the authorities in England appeared to be accentuated by a keen desire to create species. Many of these were based upon slender evidence, and were due to sex and age characteristics and not to specific distinctions. The Tasmanian form, for instance, was at first raised to specific rank as *O. meridionalis* but has since been merged into *Pseudorca crassidens*. Furthermore, the vernacular designations of the whaling fraternity were undoubtedly the cause of further confusion, as several genera and species of whales were loosely grouped under the term "Blackfish" (8). This all assisted to confuse the issue which in some respects, especially in regard to our local specimens of these species, needed clearing up even at the present time. With the examination of the specimens under review and the tabulated results given in this paper before them the students of Tasmanian Cetacea will, we hope, find the exact classification of certain of our local species an easier task in the future, than it has been in the past. The articuated specimen of *P. crassidens* in the Tasmanian Museum appears to be a very typical representative of its species for use as a comparative model, as well as being an extremely valuable Museum exhibit. (See Plate No. I.)

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(7) Trans. Recent memoirs of Cetacea. Ray Society 1864.

(8) Among others the pigmy sperm whale.

PSEUDORCA CRASSIDENS.

General osteological notes upon the Tasmanian skeleton, and a comparative table of measurements of the largest, lumbar vertebræ of that skeleton, with Reinhardt's male from Middlefart.

The skull in a wide sense is that of a small "*Orca*," and the teeth conform to the *Orca* type, in having recurved crowns, but of course are much smaller, as indicated by the following comparison with a true *Orca's* teeth, measured directly for this special purpose.

PSEUDORCA.		ORCA.
	inches	inches
(9) Total length of the largest tooth in the upper jaw	1	2
Girth of same	3½	3¼
(9) Length of largest tooth in the lower jaw ...	1½	2¼
Girth of same	3¾	4

The parietal, and squamosal moieties of the fossæ temporalis in the *Pseudorca* are quite unlike those of *Orca*, being compounded in the following way. The squamosal contributes a narrow practically, even strip, about 2 inches wide, set at an angle, and continued to near the vertex. In the *Orca* the squamosal is wide, and irregular, and takes a larger share in the formation of the fossa (upon either side). One *Orca* skull, however, in the Museum collection, makes a nearer approach to *Pseudorca* in this respect. The parietal wings of *Pseudorca* are bent backwards at a slight angle, to the line of the skull, exactly as in *Tursiops*, while in the *Orca*, the whole boundary walls of these fossæ bend outwards, as continuous outgrowths of the occiput.

In the skeleton it may be noted that five of the cervical vertebræ are strongly ankylosed together, and two are quite free.

A metapophysis appears—faintly indicated—upon the second dorsal, and well marked one upon the fourth. The seventh dorsal develops these processes at the upper level of the neural arch, in other words at the base of the neural spine. Unlike the smaller dolphins, these processes are not eliminated from the vertebræ in the region of the dorsal fin, but continue to gradually decrease after the sixth lumbar has been reached, eventually ending, *in toto*, at the ninth vertebra from the caudal extremity. The manus is wider than that of such dolphins as Globicephalus and Tursiops, and the longest finger only develops seven phalanges, instead of eighteen, as in the case of *Globicephalus*. The ossicles present are apparently the following:—

---

(9) This is ex-alveolar, enamel surface measurement.

Proximal row—Scaphoid. Lunare. Cuneiform.
Distal row—Trapezoid. Magnum. Unciform.

In each hand the cuneiform is closely attached by immersed cartilage, to the ulna, and as the whale was immature it might have ankylosed later in life had the animal continued to live.

Pseudorca crassidens.

Comparative skulls of well authenticated specimens.

Skull and skeleton in Tasmanian Museum, Hobart, Tasmania.		Adult skull in the Royal College of Surgeons' Museum, London.	Skull of Reinhardt's Specimen ♂	Prof. Owens fossil skull.
SKULL.		SKULL.	SKULL.	SKULL.
	inches	inches	inches	inches
Beak to condyles	24	23¼	24	mutilated *circa* 24
Maxillary notch to tip of beak	12	11¼	11	12½
Breadth across the zygomatic processes of the squamosal	15	13	14 1·12	No data given
Height at vertex of the skull	10	8¾	No data	No data
Breadth across ridges of fossæ temporalis	8¾	No data	8¼	No data
Breadth of beak at notch ...	7¾	7¼	8 1·12	8½
Breadth across the beak in region of third tooth from end of series	7½	No data	7½	8
Breadth of the intermaxillaries and the intervening space	5⅛	4½	No data 5½	5½
Length of right ramus of the mandible, tip to posterior edge of last tooth	9½	9¾	9 5·12	10
Length of the dental series of the upper jaw	10	No data	9¾	10
Height of right ramus at the coronoid process	5⅜	5	No data	No data
Total length of the right ramus of the mandible ...	19¼	19	18⅓	21

Pseudorca crassidens.

Comparative measurements of the Tasmanian and North Sea specimens.

— *Skeletons.* —

Tasmanian Specimen from Adventure Bay.			Reinhardt's male specimen from Middlefart.	
	feet	inches	feet	inches
Total length of the skeleton ... (10)	14	6	13	5
Length of seven cervical vertebræ ...	0	3¼	0	3⅛
Length of lumbar series to the vertebræ with the first hæmapophysis ...	3	5¾	3	5
Total length of caudals ... ... (10)	5	8½	5	3½
Breadth of the largest lumbar	1	0⅝	1	0 5-6
Height of scapula from middle of articular cavity to middle of suprascapular rim	0	8⅛	0	7½
Greatest breadth of the scapula .	0	11⅝	0	10 5-6
Length of Humerus	0	4½	0	4½
Do. of Radius	0	5	0	4 7-12
Do. of Ulna...	0	5	0	3½
Distal width of both arm bones... ...	0	5⅞	0	5⅛
Length of the manus in a recent and undried condition	no data		1	0

ORCA GLADIATOR.

(*Orca capensis.*)

PLATES II., III., IV., V., VI., VII., VIII.

For detailed synonymy see :—

Gray, B.M. Cat. Seals and Whales (1866), p. 278-290.

The prevailing opinion seems to favour the reduction of the representatives of this genus to one species—*Orca gladiator.* We have adopted this view and made *Orca capensis* a synonym of *Orca gladiator.* Should, however, *capensis* be again raised to specific rank we are of opinion that the Tasmanian forms should be included, as they appear to have the characters at one time allotted to *capensis* in order to separate it from *gladiator.* We formed this opinion after comparing the Tasmanian skulls with the figured ones of *Orca capensis* reproduced by Gray in the Zoology of the Voyage of the Erebus and Terror. (Plate IX.)

Unfortunately portions of the skeleton examined by us had disappeared. This is greatly to be regretted, especially as the mandible was one of the missing portions. As a recompense, however, there was a second complete skull, in a splendid state of preservation, which permitted a series of comparative measurements being taken. This skull formed part of the Crowther collection, and bore eloquent testimony regarding the confusion of species previously alluded to. It was labelled "*Pseudorca meridionalis*—Donor, W. L. Crowther, Esqr," but there can be no doubt that its correct classification is that of *Orca*. Whether *gladiator*, or *capensis*, is a matter of individual opinion, but we would again draw attention to the fact that whales vary greatly as regards sex and age characteristics, and far too many species in the past have been created on insufficient evidence. We desire particularly to refrain from adding further to the confused nomenclature, and prefer to treat the present example as a member of the cosmopolitan species *O. gladiator*.

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(10) In this articulated skeleton (Plate I.), the intervertebral pads are thick, in fact exceptionally so, and if this excess is allowed for, the two skeletons are of almost similar length.

ORCA GLADIATOR.

A detached skull, and a skull with many of the associated bones of the skeleton, exist in the Museum collection, and unless otherwise stated the notes given herewith relate to the latter.

Skull.

The skull is extremely heavy in build, following the general contour of the true dolphins with wide, even massive, squamosal regions, notched beak, and maxillary bosses two inches—or more—in thickness. The vertex gives characters that by reason of its squared ridges distinguish it immediately from *Globicephalus*, and in part from the *Pseudorca*.

This skull—which unfortunately is devoid of a mandible—is three feet three and a half inches long, two feet two inches wide, and one foot five and a half inches high, from the par-occipital processes to the vertex. Its greatest maxillary width is in the region of the pre-orbital process of the frontal, where it yields a measurement of twenty-two inches, it then contracts to twenty inches at the notch (if we still follow the outline of the skull). Across the actual notch itself, we get a measurement of twelve inches nearly—and rather more at the middle of the beak.

Viewed from below, it is of interest to note, that the intermaxillaries appear in the palate as a well marked pair of wedge shaped strips, some fourteen inches long—or half of the total palatal length. The vomer appears for four inches only, its apex being eleven inches from the tip of the beak. In *Globicephalus* the intermaxillaries only obtrude upon the palate for three inches, out of a total length of fourteen, and the vomer is continued outwards to within two and a quarter inches of the tip of the beak. As far as it is possible to determine from the articulated skeleton of *Pseudorca*, this latter whale followed the *Orca*, and not *Globicephalus* in this respect, in any case it certainly followed *Orca* in having fairly extensive palatine moieties instead of the palatal bones being reduced to the merest strips as in *Globicephalus*. This character alone is sufficient to quickly separate skulls of *Pseudorca* from those of *Globiocephalus*.

The second skull in the Museum collection (Plate II.) is an extremely well prepared specimen, evidently cleaned under Doctor Crowther's strictest instructions—the teeth aro all *in situ*, the membrane of the hard palate having been left for the purpose of their protection—nothing could exceed this method of making a museum specimen, as far as it relates to the teeth, but a central area left open to reveal the vomer, and intermaxillaries, would be a desideratum. In point of size, this second skull closely resembles the one just passed in review, but as it is in much better condition the table of measurements appended was compiled from it, and not the skull with the associated appendicular bones.

Skull of an Orca, presented by Dr. W. L. Crowther, F.R.C.S.

Plate II.

	ft.	in.
Total length	3	1¾
Width at maxillary notch	1	1½
Width at pre-orbital process of the frontal	2	2¼
Width of maxillary at this point	1	10
Height from par-occipitals to vertex	1	5½
Greatest width of palate inside teeth ... ... (Midway between the last two)	0	10½
Width at seventh pair of teeth	0	9½
Total length of tooth line	1	1½
Width of pterygoids	0	6¾
Tips of pterygoids to the occipital condyles	1	1½
Width of fossa temporalis	0	6
Height of fossa temporalis	0	6½
(Both of the above taken from the palatal aspect.)		
Total length of malar bone	0	11¼
Diameter of blowers taken from the palatal aspect —antero-posterior measurement	0	4¼
Transverse measurement	0	5⅝

	ft.	in.
Occipital condyles along the curve—vertical measurement	0	8
Ditto transverse measurement	0	4¼
Total width of the articular and space taken along the curve	0	10½

Skeleton.

The cervical vertebræ, and the first dorsal, make such a compact series that for both illustrative and descriptive purposes they are here considered together (Plate III.). The first three cervicals are completely ankylosed, and the rest are quite free, this is in contrast to the *Pseudorca*, and *Globicephalus*, in which whales all the series are welded together into a solid mass. The neural spine of the axis slopes backwards at an angle of 45 degrees, and being some five inches in length, approaches the spine of the dorsal to within an inch and a quarter. The whole block measure nine and a quarter inches in antero-posterior extension, and the first pair of diapophyses yield a measurement of fifteen and a half inches across. The neural canal, taken through the atlas, is three and a half inches wide, and two and three-quarters high, and the first dorsal vertebra gives practically similar results.

For the general contour of this block of vertebræ see the illustration, it being only necessary to add that the block is ten inches high, to the top of the neural spines.

Dorsal Series. (Plate IV.)

Four vertebræ of the dorsal series are illustrated to show general outline, and the progressive rise of the metapophyses upon the neural spines. The length of this block is twelve and three-fourth inches for the three, and the height of the neural spine of the tallest vertebra is thirteen and three-quarter inches, from the keel of the centrum. The reversed vertebra is that which of the series is nearest to the skull, and therefore the transverse processes (Diapophyses) are extremely short. As a guide to size, it may be said that the neural canal of this vertebra is four inches across, and the centrum measures four and three-quarters in either direction.

Lumbars. (Plate V.)

Four early lumbars are shown, and a sequent fifth, reversed as in the other illustrations. These vertebræ do not carry hæmapophyses (Chevrons), and are, of course, ribless. The metapophyses are still strongly developed, although from their position they perhaps might be called zygapophyses.

In the evolution of whales, the true zygapophyses on the dorsal series have been overlapped by the metapophyses, that have in consequence suffered a complete atrophy.

Chevron-bearing Vertebræ. (Plate VI.)

These vertebræ beautifully illustrate the reduction of the metapophyses upon the neural spines as we advance tailward. Hæmad, they carry bony arches to protect the extensive blood vessels that go to nourish the powerful tail—such bones which relate to the vertebral hæmal arch may be designated either "hæmal arches," or chevron bones.

Sternum of Orca. (Plate VII.)

An excellent illustration of the sternum of this Orca is depicted. As will be noted the anterior moiety (manubrium) is penetrated by a fossa, an inch and seven-eighths long, and one inch wide. The articular facets of four ribs are manifest, the next few pairs being articulated by cartilage to the distal (or ziphoid) end of the sternum. This arrangement is to be seen in the articulated skeleton of the pseudorca shown in connection with the description of that animal.

Ribs. (Plate VIII.)

To practically illustrate the awful fights that "Killers" indulge in, and their incidental results, some of the ribs of this Orca have been photographed. These ribs are paired, and therefore the mutilated rib can be directly compared with its normal congener. Apparently this particular specimen was unusually unlucky, for having early in life broken several ribs upon one side, and tided over the misadventure, he lived to face a second similar, but more extensive, fracture upon the other side. This second accident was responsible for the awful distortions shown in the picture.

GLOBICEPHALUS MELAS.

(For detailed Synonymy see Gray, B.M. Cat. Whales, p 313, *et seq.*).

The specimens representing *Globicephalus* (Nos. 5, 6, 7 and 8) consisted of three skeletons, of which two were complete, and a non-associated skull (Plate IX.). These are undoubtedly specimens presented by the late Dr W. L Crowther, and were evidently carefully prepared in order to show certain essential data. The three specimens may be classed as follows:—

A. (No. 5) shows the characters of an adult male.

B. (No. 6) shows the characters of an adult female.

C. (No. 7) shows the characters of an immature *Globicephalus.*

As the sex characters of all whales need working out, these specimens will supply data of extreme interest, and it is felt that the comparative tables given in the following pages will prove useful to students of the *Cetacea* in the future.

It is of interest to note that the immature characters are well marked off from the mature. Of this characteristic little or nothing has previously been published as far as we are aware.

In the past whales belonging to the genus *Globicephalus* have been confused with specimens of *Pseudorca.* When they are compared casually this is not to be wondered at. Their similar size, colour, and general external appearance all lend their aid to the confusion which has undoubtedly existed. Even Ziphoid whales have at times been incorporated.

While the examination of the present series will, it is confidently hoped, prove of value, it is to be regretted that there are certain missing links. For the last fifty years apparently these valuable specimens have been stowed away. From time to time there have been alterations in the stores, and there is evidence which goes to show that a number of the missing parts relating to these skeletons were evidently stored separately, and were disposed of some years ago as useless odd examples. This is greatly to be regretted, but sufficient remains, especially in the case of this species, to allow an examination of its chief characteristics, both as regards sex and age.

GLOBICEPHALUS MELAS. (Plate IX.)

As *Globicephalus* skulls have been confounded with those of the *Pseudorca*, it is important that their comparative osteology should be made clear. The palatine character given under the heading of *Orca*, in this paper, will always serve to separate the skulls unless extreme mutilation (as in the case of a fossil specimen) makes it impossible to apply this test—under such extreme circumstances the following data may be consulted.

Comparative Characters.

(1) In *Globicephalus* the maxillary wings practically cover the frontal upon all its faces, except at the vertex, where a narrow strip is left exposed.

(2) In *Pseudorca* the frontal is well exposed all round, namely, for anything from half to three-quarters of an inch, the greater amount being at the vertex, and the lesser along the orbit and fossa temporalis.

(3) In *Globicephalus* the pre-frontal moieties are

large, well rounded bosses, even in immature skulls. but in Pseudorca they are small, and are closely associated with the frontals—and we strongly suspect in old skulls would ankylose to extinction with the frontals.

In point of comparative sizes, it may be said—An immature *Globicephalus* whale, in whose skeleton the epiphyses are quite free, will have a skull as large as that of an adult *Pseudorca*, in which all the vertebral epiphyses are ankylosed to extinction.

As has been pointed out, in the introduction to the osteology of the *Orcas'* skull, in the Museum collection, many valuable cetacean remains have been rejected in past years, and as the skulls belonging to Dr. Crowther's specimens were too large to store in the cases that carried the skeletons, they were either put on view in the Museum, as detached exhibits, or else stored at the back of the Museum (somewhat exposed to the weather!). In this way, the skull of the matured female of Crowther's donation became lost, and the matured male's skull was disassociated from its skeleton, and the same happened with the immature skull. Both of the latter have now been restored to their respective skeletons, and a third (old male) non-associated skull has been brought to light. As a result therefore of this confusion the adult female of Crowther's donation is minus its skull, while a spare male skull is available. The following table will show the comparison between the two adult male skulls, and that of the immature *Globicephalus*.

Comparative skulls of *Globicephalus*
In the collection of the Tasmanian Museum, Hobart.

	Dr. Crowther's specimen ♂ associate of the skeleton.	Adult ♂ skull non-associate of any other remains available.	Dr. Crowther's specimen immature skull.
	inches	inches	inches
Greatest length	26	26	23½
Height	13¾	14	11
Greatest width	19¼	19⅛	15¼
Width at notch	10½	11	8¼
Across anterior nares	7½	7¾	5¾
Width of fossa temporalis	5	5	3⅜
Height of fossa temporalis	5¾	5¾	4¾
Width of palatines as they contribute moieties to the true palate, to compare with an orca, giving 2½ inches from the tips of the pterygoids	1*	1¼	½

* Rather mutilated.

In the above notes it has been our object to supply actual data, and not to repeat the published characters. (11).

General Notes upon the Skeletons.

ADULT MALE.	ADULT FEMALE.	IMMATURE. ♂
All cervicals ankylosed, but not to sutural extinction, last two open. No super ossification. (Animal almost adult—compare size of skull with that of the other male.)	All cervicals ankylosed, not to extinction, last two open, much super ossification. Spine of the axis blending strongly with those of the rest of the series.	Cervicals ankylosed—lightly, but firmly, except the 7th, which is loose. Five sutures wide open. Right neurapophysis has not blended with its fellow moiety.
Twelve dorsal vertebræ measure, in antero-posterior extension—3ft. 2in.	Twelve dorsals measure—2ft. 7in.	Twelve dorsals measure—2ft. 5½in.
Epiphyses not ankylosed to centra of vertebræ.	Epiphyses of all vertebræ ankylosed to centra, and sutures extinct.	All epiphyses quite free from the centra.
Total length of vertebral series, minus skull—14ft. 6in.	Length of vertebral series—10ft. 10in	Length of vertebral series—10ft. 10½in.

ADULT MALE.		ADULT FEMALE.		IMMATURE. ♂	
Ribs, 11 to 12 pairs.		Ribs, 11 to 12 pairs.		Ribs, 11 to 12 pairs.	
	inches		inches		inches
Twentieth vertebra from skull, width across diapophyses ...	15	Twentieth vertebra from skull, width across diapophyses ...	11	Twentieth vertebra from skull, width across diapophyses ...	13
Length of body..	4	Length of body ...	3½	Length of body...	3¼
Height to tip of spine	11½	Height to tip of spine...	9½	Height to tip of spine ..	9½
Across centrum	3⅞	Across centrum ...	3	Across centrum	3⅜
Vertical	3½	Vertical	2¾	Vertical	3⅛
Scapula.		Scapula.		Scapula.	
Glenoid to suprascapular rim ...	10½	Glenoid to scapular rim	9½	Glenoid to scapular rim	8½
Transverse ...	15¼	Transverse	13½	Transverse ...	12½

From the above comparative measurements it will be manifest that the adult male exceeds the adult female, in size, by anything up to four feet, or over, and that an im-

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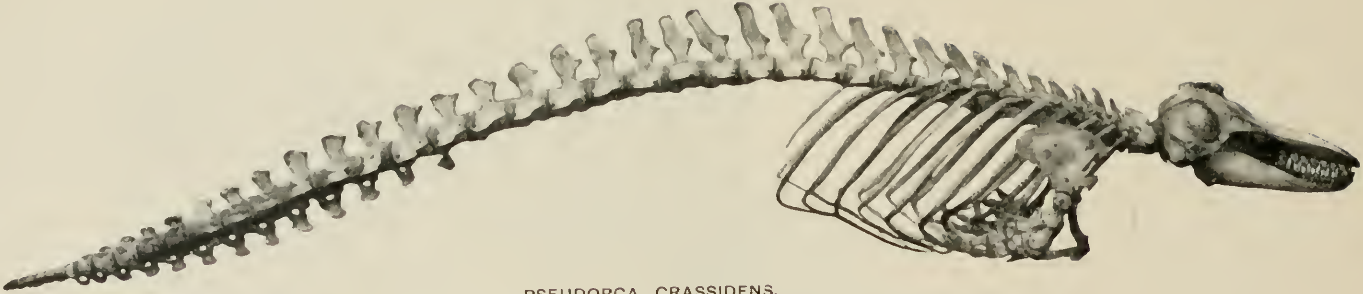
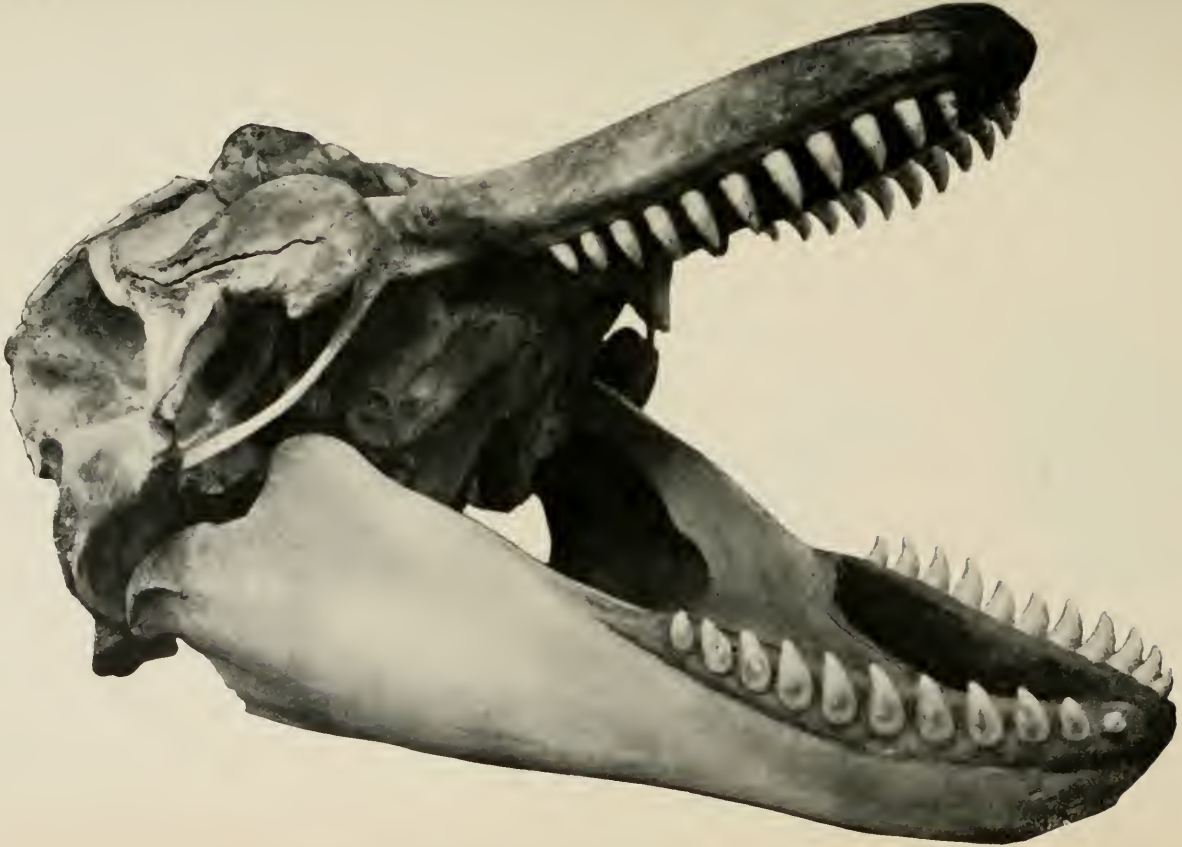
(11) Such as already given by Beddard in *A Book of Whales* and *The Cambridge Natural History* (*Mammals*), etc.



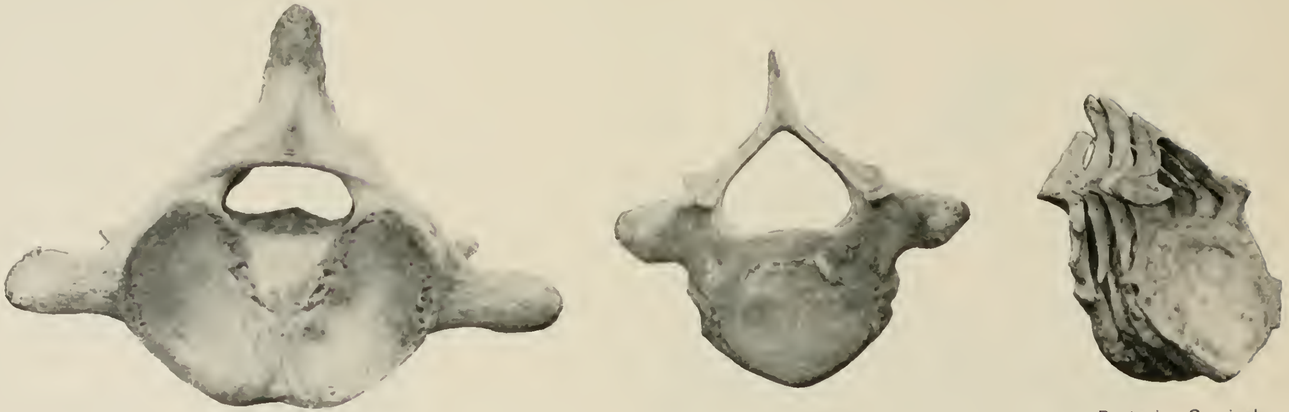
PSEUDORCA CRASSIDENS.

Plate II.



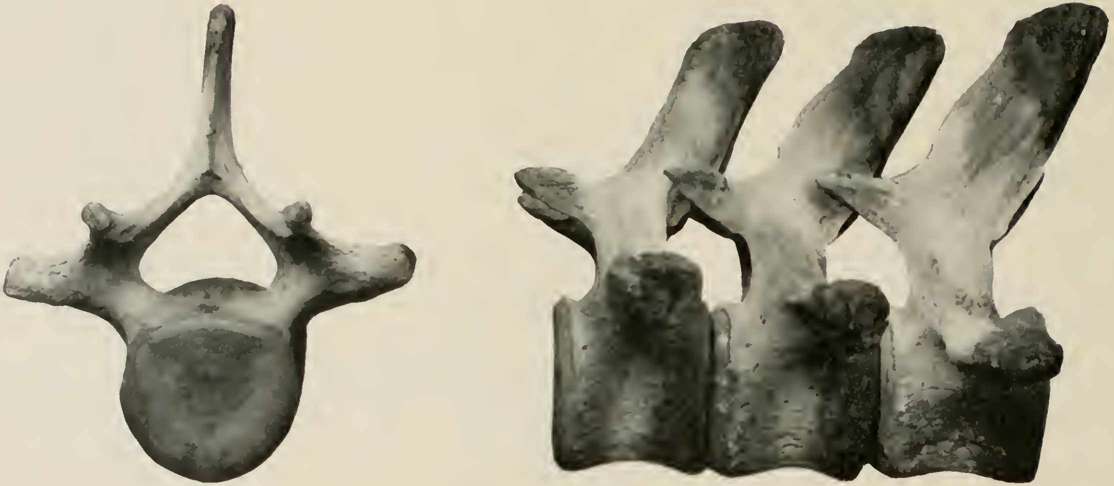
ORCA GLADIATOR.

Plate III.



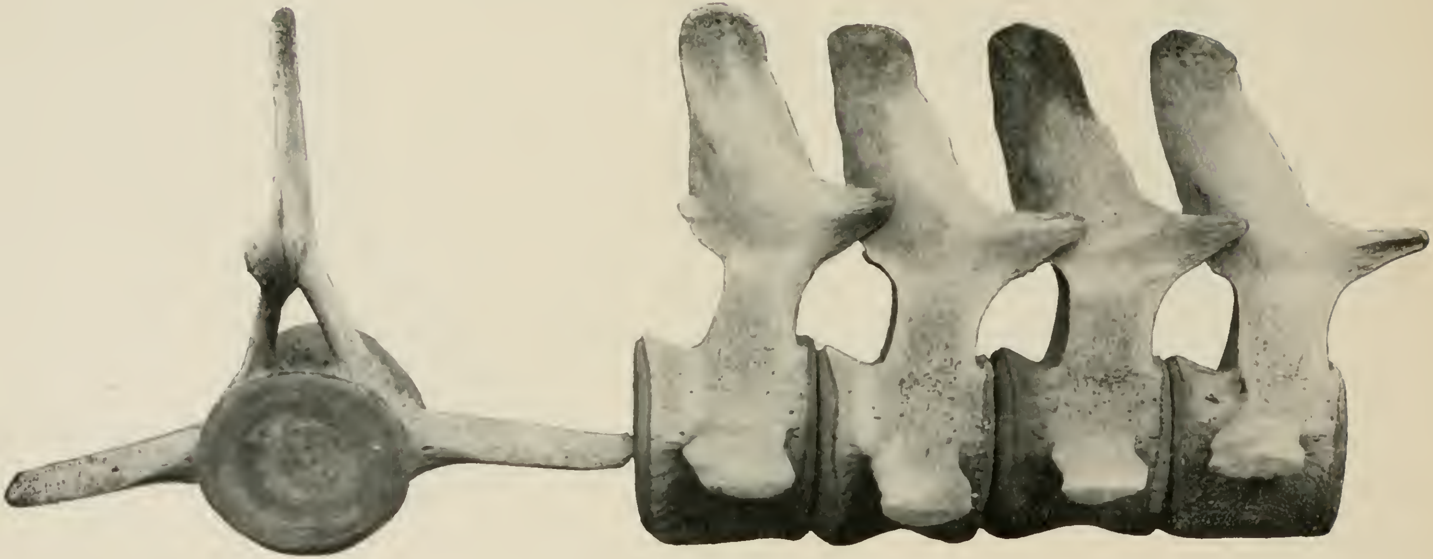
Anterior Cervicals. First Dorsal. Posterior Cervicals.

ORCA GLADIATOR.



ORCA GLADIATOR.

Plate V.



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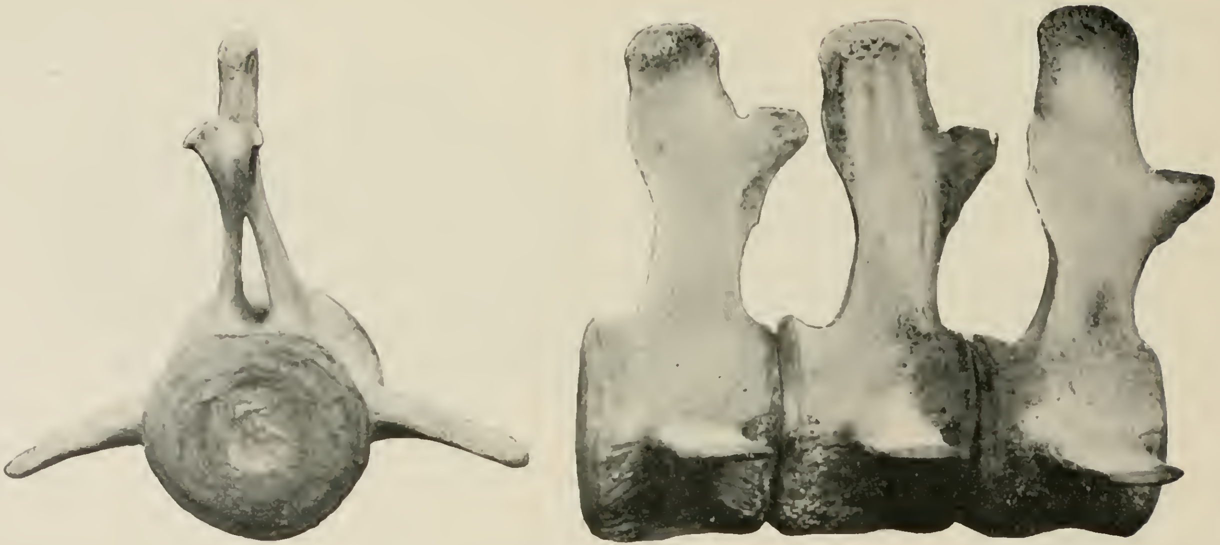

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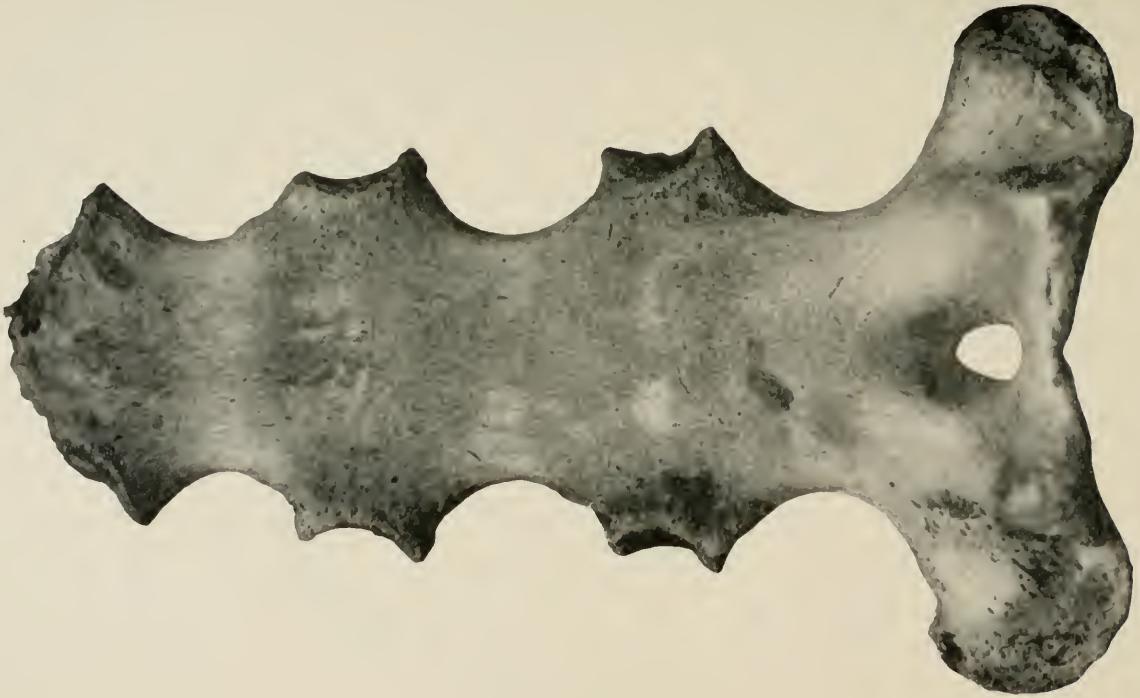
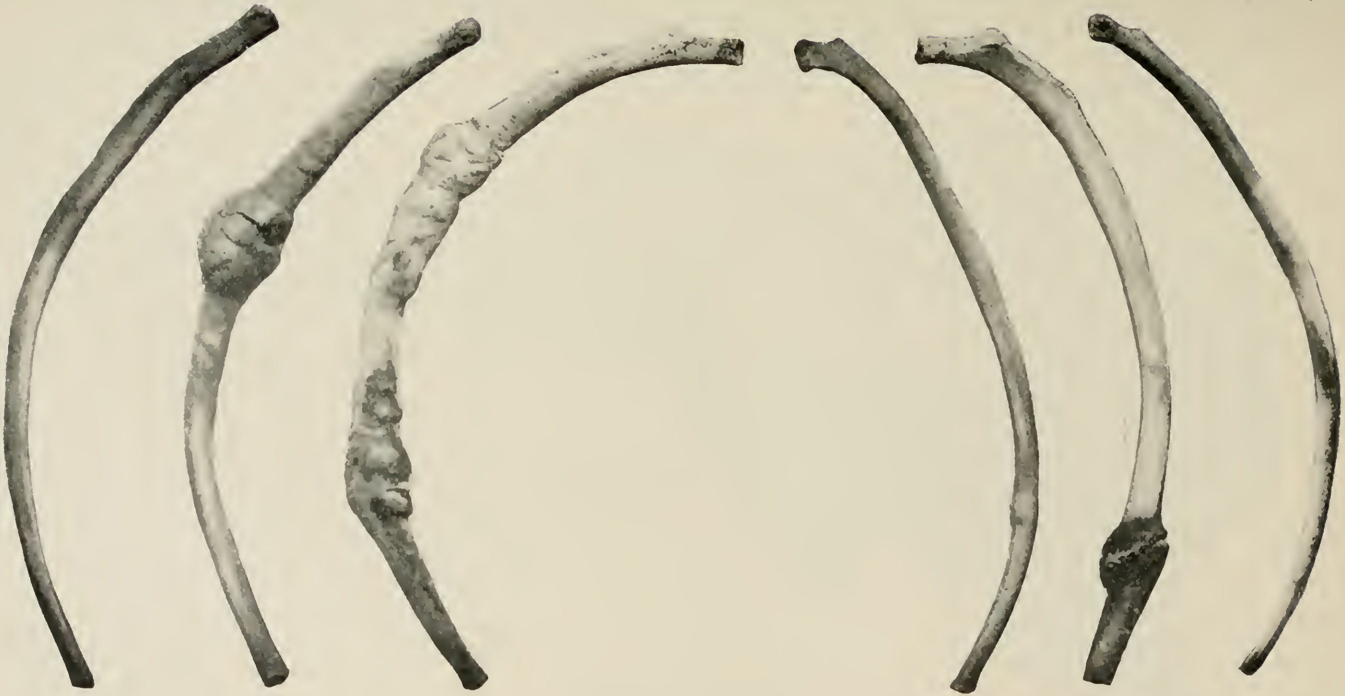
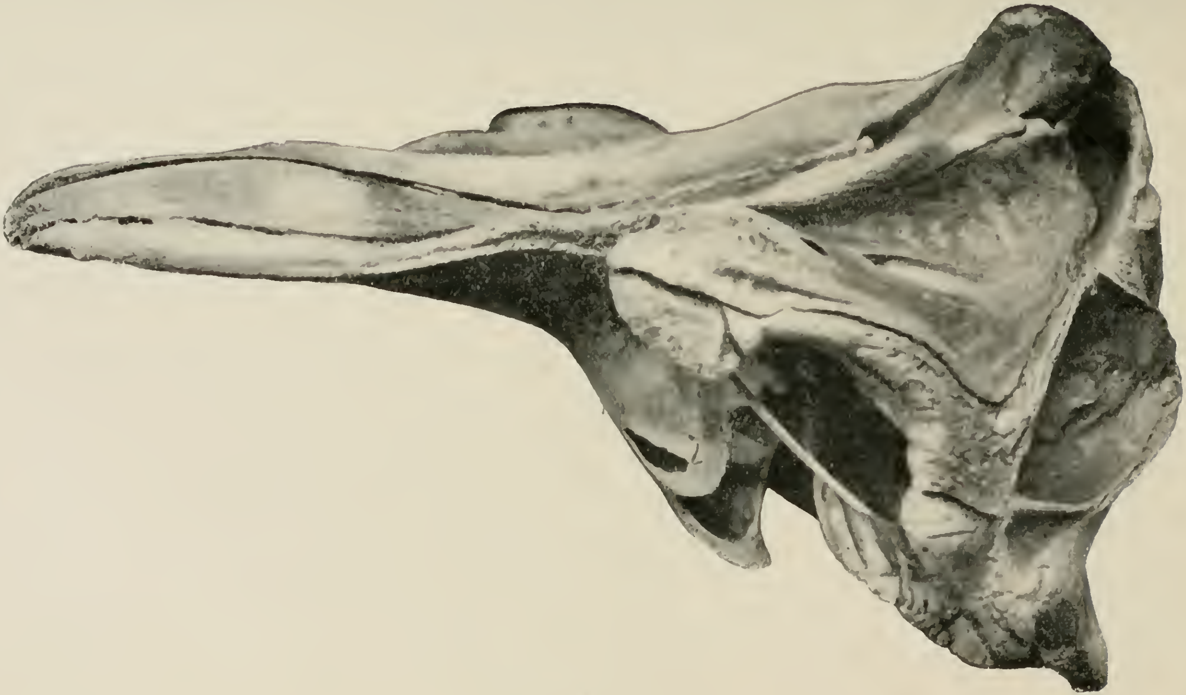


ORCA GLADIATOR.

Plate VIII.



ORCA GLADIATOR.



GLOBICEPHALUS MELAS.

mature male, with all the epiphyses of the vertebræ open, is close to the stature of the female. The following characters were noted, as marking the female off from the mature and immature males.

1. Diapophyses of the dorsal ribs longer than in the other two animals.

2. First, cervical, neural spine covers more vertebræ.

3. No bicipital groove between head and trochanter of the humerus. Articular surfaces set at a more oblique angle (12).

4. Supra scapular rim was centrally elevated, and not depressed, and the pre, and post, scapular fossæ made a nearer approach to the roughened fossæ of *Tursiops* than either of the other specimens here detailed.

We hope in our next paper to give exhaustive data relating to sex variations in the genus *Tursiops*, and the notes here supplied will receive added value from the light thus thrown upon a vexed question.

In conclusion, we desire to express our thanks to Mr. John Arnold, Chief Assistant of the Tasmanian Museum, for the willing and courteous assistance rendered to us during the examination of the specimens.

DESCRIPTION OF PLATES.

Plate I.

Articulated skeleton of *Pseudorca crassidens* from Adventure Bay, Tasmania.

Plate II.

Skull of *Orca gladiator*.

Plate III.

Cervical vertebræ and first dorsal of *Orca gladiator*.

Plate IV.

Four vertebræ of the Dorsal Series (*O. gladiator*).

Plate V.

Five vertebræ of the Lumbar series (*O. gladiator*).

Plate VI.

Four chevron bearing vertebræ (*O. gladiator*).

Plate VII.

Sternum of *Orca gladiator*.

Plate VIII.

Series of Ribs of *Orca gladiator* (showing broken ribs).

Plate IX.

Skull of *Globicephalus melas*.

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(12) These arm bones are only provisionally associated with this skeleton, and may not belong to it. Various dolphin remains—evidently odd scraps of later date than Dr. Crowther's specimens—had been added to the box from time to time; these included some *Tursiops* bones of no value.

NOTES ON THE GEOLOGY OF WINEGLASS BAY.

By W. H. Clemes, B.A., B.Sc.

[Received 20th March, 1919. Read 14th April, 1919.]

During a recent visit to Wineglass Bay I was enabled to make a cursory examination of the neighbourhood, and. as the locality has not been described in any detail, a few notes may be useful as a guide to future workers.

Wineglass or Thouin Bay is situated on the eastern side of the isthmus joining Freycinet Peninsula to Schouten Main, which, together with Schouten Island, form the eastern boundary of Oyster or Fleurieu Bay. The whole consists of a magnificent series of granite peaks, extending for 12 miles in a north and south direction, the highest, Mount Freycinet, rising to the height of 2,014ft. above the sea. This granite occurs in a meridional line, extending from Flinders Island to the Hippolyte Rocks, off Tasman Peninsula, and is contemporaneous with the granite massifs of the West Coast. It is to be found penetrating all rocks earlier than the Permo-Carboniferous, but has not been seen intrusive in strata of a later age. It is usually distinguished from the earlier granites and syenites by its uncrushed character, though in places it has been subjected to a certain amount of dynamic stress.

The granite at Wineglass Bay varies considerably. The normal rock is a coarse-grained granite, pink with flesh-coloured orthoclase. The chief constituents are orthoclase, quartz and biotite. The latter appears in green chloritised crystals, and is quite subordinate in quantity. In large boulders at the northern end of the beach appears a medium-grained biotite-granite, the composition of which is quartz, biotite and felspar. Much of the latter will probably be found to be plagioclastic. This is the more typical East Coast granite. Running through this are veins of granite porphyry, in which the ground mass looks quartzose, with scattered crystals of quartz, biotite and muscovite throughout. In other veins there is a concentration of the biotite. A wide vein of this biotite-granite was reported as running up the hill from the water's edge on the northern side of the bay, but I did not come across it. A broad vein about 20ft. wide is found on the south side of the bay. This is also a granite porphyry of magnificent appearance. It consists of pink orthoclase and quartz in a quartzose ground mass. The ferro-magnesian constituents are very few. Running through the boulders on the sides of Mt. Hazard are to be found narrow veins of microgranite, a very fine-grained variety composed of felspar, biotite and quartz. On the northern side of the bay also occurred a highly porphyritic granite with large crystals of felspar (orthoclase?), also quartz, biotite and muscovite.

Numerous quartz veins traversed the rock in a more or less north and south direction, and varied considerably in size. They varied also in colour from rose to white, and there were numerous nests of rock crystals. There was no evidence of the greisenised zone, carrying tin, found at the northern end of Schouten Main.

At intervals along the south side of the bay are parallel dykes of dark rock, running approximately north and south. This rock has previously been referred to by Dr. Milligan, who thought that it was greenstone, and certainly it somewhat resembles diabase or dolerite to the naked eye. But microscopically it is resolvable into a combination of plagioclase, felspar, and hornblende, and is therefore a diorite. Some biotite is also present. The felspars in lath-shaped sections exhibit both albite and Carlsbad twinning, and from the extinction angles belong to the oligoclase-andesine series. The biotite where not chloritised is brown in colour. The hornblende is irregular in form and green. It is mostly chloritised to some extent, during which process iron oxide has separated out abundantly. Diorite is a rock which is met with in more than one form of occurrence. It may exist in dyke form, or as a separate rock mass, or finally as a facies of granite. The structure of the present rock is consonant with its occurrence either as a facies or a dyke. Evidently it has genetic connection with the granite rock of Freycinet Peninsula. In one vein close to the water's edge large crystals of felspar were to be seen embedded in the diorite, which there appeared more grey in colour. I was not able to examine it closer owing to its position and the lack of time, but it appeared as if some absorption of the constituents of the granite had taken place, leading one almost to suppose that the dyke theory was more probable, but there is not sufficient data to dogmatise about the matter. They certainly appear to be xenocrysts rather than phenocrysts.

Most of the hills appear as great boss-like masses with rounded surfaces, curiously streaked by the descending waters charged with mineral matter. These hills descend right into the sea, with little or no foreshore. Along the east coast great cliffs have been formed, seamed with cracks and joints, and showing traces in parts of columnar structure on the outer and upper faces. The structures seen in many of the cliffs indicate that there has been intense dynamic stress taking place in part during consolidation, but mostly subsequently. The sinking of the land to the East, approximately along this line of granite, may have tended to weaken the structure. The deformation of the granite on Maria Island appears to have been of a more intensive nature, though not nearly so severe as in the earlier granites.

Very few traces of the older or subsequent strata are to be found. The rate of denudation and sea erosion is and has been very great. Silurian slates appear at Blue Stone Bay. Cretaceous diabase is found at Buckley's, on the south side of Hazard Bay, and on Schouten Island, the two latter deposits being fringed with Mesozoic sandstones. In speaking of Oyster Bay. Mr. Twelvetrees reports:—"The form of Oyster Bay illustrates the eroding force of the waves on a large scale. We must believe that the surviving fringe of diabase on the E. side of the bay at Hepburn's Point, on the S.W. of the Peninsula, and on Schouten Island, was once continuous with the sea-front of the same rock on the Swansea side of the bay. The fragmentary deposits of Mesozoic sandstone (freestone) associated with the diabase indicate that it, too, extended across the bay to Kelvedon. It follows, accordingly, that the present Oyster Bay has been scooped out of the coal measures, sandstones and diabase, the eroding process being, perhaps, assisted in its initial stages by the weakness of the strata along the contact line of the diabase with granite on the eastern shore of the bay. The excavating process has extended to a depth of 12 fathoms, on the average. The present depth of the bay does not represent the sum total of erosion since the coal period, for it has probably been reduced by deposition in Tertiary times of sediments, which have since been denuded as the land has risen again. The Tertiary deposits in the lower part of the valleys of the Swan and the Apsley illustrate the depression and subsequent elevation of the land during that period, observed frequently elsewhere in Tasmania."

The sand forming the beach at Wineglass Bay is very white, being composed almost entirely of quartz and small rounded particles of felspar. In Hazard Bay, however, it is more yellow in colour, and contains much felspar and many shell fragments. The isthmus itself is composed of a broad flat, fringed with high sandhills, and somewhat hollowed in the centre, forming a large shallow lagoon. The general appearance would lead one to suppose that it is the result of subsidence rather than the result of the accumulation of drifting sand, though the rapid disintegration would account for abundance of material. An interesting field of study would be the formation of the tied-islands and isthmuses of S.E. Tasmania. The amount of evidence here is very little, and no definite conclusions could be formed without further examination. There is no doubt that the peninsula was separated from Schouten Main just as at present Schouten Island is separated from the peninsula, and also that the different character of the rocks on the north and south side of the bay would lead to the conclusion that they represent two quite distinct intratelluric intrusions, which were, however, approximately contemporaneous, but further investigation must be left to a subsequent visit. In conclusion, I must express my indebtedness to Mr. Twelvetrees, who gave me valuable assistance in checking the constituents of the rocks found, and especially in determining the composition of the diorite.

ON THE OCCURRENCE IN TASMANIA OF *HYDRUS PLATURUS*, Linn. (1)

By Clive E. Lord,

Curator of the Tasmanian Museum.

(Received 5th May, 1919. Read 10th June, 1919.)

Tasmania is usually credited with three terrestrial and one aquatic snake. The latter species—*P. laticaudatus*—has only been noted on rare occasions. It is interesting, therefore, to record that a second aquatic species has been found on the Tasmanian Coast. A specimen recently forwarded to the Museum from Scamander, on the East Coast, proves to be a typical example of the Spotted-tailed Sea Snake (*Hydrus platurus*). This is the first record of this species for Tasmania, and it may be of interest to quote certain particulars regarding its discovery.

Mr. J. Stanley Hodgson, who kindly forwarded the specimen to the Museum, has (5/3/1919) given me the following information:—"My daughter and self found the "snake at Shelly Point, about two miles north of Sca-"mander. He was basking in the sun, laid on a heap of "seaweed. At first I took him for an eel, and killed him "with the intention of eating him, but on picking him up "I soon found that there was nothing of the eel about "him, and, as nobody seemed to know exactly what he "was, I sent him to you."

The range of this snake is usually given as the Tropical and Sub-Tropical Pacific, and I know of no previous record of its occurrence in Tasmanian seas. The present record should, therefore, be of interest.

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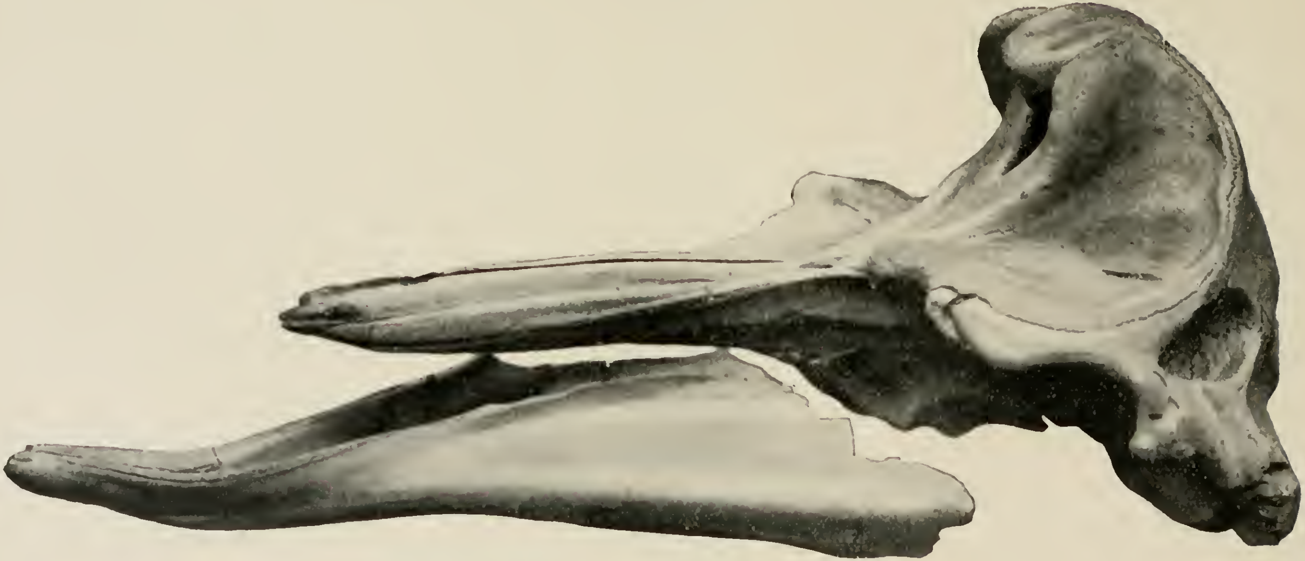
(1) Ref.—Boulanger; Cat. Snakes, Brit. Mus. (1896), Vol. III., p 26.



ZIPHIUS CAVIROSTRIS.

STUDIES OF TASMANIAN CETACEA.

Part II.

(*Ziphius cavirostris.*)

By
H. H. Scott (Curator of the Victoria Museum, Launceston) and
Clive E. Lord (Curator of the Tasmanian Museum, Hobart).

Plate X.

(Received 18th June, 1919. Read 11th July, 1919.)

INTRODUCTION.

We had contemplated dealing with the genus *Tursiops* in the first portion of the present paper, but, owing to several unforeseen circumstances, we propose to place on record certain data compiled in relation to the species *Ziphius cavirostris* before proceeding to deal with *Tursiops tursio* as a Tasmanian species.

ZIPHIUS CAVIROSTRIS, Cuvier.

For detailed synonymy see:—

Gray, Brit. Mus. Cat. Seals and Whales, *Epidon*, p. 340 *et seq.* (1865).

And for later nomenclature, etc.:—

True, Bulletin 73, U.S. Nat. Museum, p. 30 (1910).

As with the majority of the Cetacean order, the nomenclature is involved, and the species described are numerous. Fortunately, in this instance it was recognised rather sooner than in others that there was probably only one species, and that this was practically cosmopolitan in distribution.

Mr. F. W. True has given an excellent account of this species [1] and we have pleasure in the present instance in adding to the existing knowledge by describing a skull in the collection of the Tasmanian Museum.

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(1) True, Bulletin 73, U.S. Nat. Museum, 1910.

This skull was obtained from the Tasmanian Coast. This fact is of interest, for, although the species under review has on several occasions been recorded from New Zealand, (2) we are aware of no previous record from Australian seas. It is an unfortunate fact that the Tasmanian skull has been stored away for many years without any reference being made to it. In the latest work dealing with zoogeography (3) the following reference to this species occurs. In dealing with the mammals of the North Atlantic:—

> "Cuvier's beaked whale (*Ziphius cavirostris*), "although but seldom met with, appears to be "of world-wide distribution. It is distinguished "by the two conical teeth at the tip of the lower "jaw, as well as by the circumstance that only "the first three vertebræ of the neck are fused "together." (4)

And in dealing with the Indo-Pacific and its shores:—

> "Cuvier's beaked whale (*Ziphius cuvieri*) is also "probably an inhabitant of the Indo-Pacific." (5a)

There can be no doubt that the same species is intended, but it is unfortunate that the nomenclature should not agree, even in the same work, for this cetacean. The synonymy is sufficiently involved without such additions as these. Another point to be noticed is that the ankylosis of the first three cervical vertebræ mentioned by Lydekker is not a constant feature for this species. It probably varies with age.

Dr. S. F. Harmer has recently given an account (5b) of *Ziphius cavirostris* from the Irish Coast, and also stated his intention of publishing a further account, but we are not aware if this has yet appeared. In dealing with the distribution of *Ziphius* he states that the best available evidence "leads to the conclusion that *Ziphius cavirostris* is "a cosmopolitan species which inhabits the open oceans "of the world, and is occasionally stranded."

True has recorded (6) where more than three of the cervical vertebræ have been ankylosed. Except in such instances as *Hyperoodon*, where all the cervical vertebræ are ankylosed, the fusing of more or less of the cervicals does not appear to be a generic constant.

Considerable research has yet to be done in order to exactly establish the exact generic and specific characters of the ziphoid whales in general. It may be taken for granted, however, that representatives of such genera as *Ziphius*, *Hyperoodon*, *Mesoplodon*, and *Berardius* visit Tasmanian seas, but probably only at rare intervals. Owing to the rugged nature of our coasts and the failure to report stranded whales to the proper authorities, it is only on very rare occasions that specimens are obtained for scientific investigation.

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(2) For instance, see Trans. N.Z. Institute, Vol. 9.

(3) Lydekker, Wild Life of the World.

(4) Lydekker, Wild Life of the World, Vol II., p. 246.

(5a) *Id.* Vol. III., p. 327.

(5b) Proc. Zoo. Soc. of London, 1915, p. 559.

(6) True, Bulletin 73, U.S Nat. Mus., p. 38 (1910).

HISTORY OF THE TASMANIAN MUSEUM SPECIMEN OF *ZIPHIUS CAVIROSTRIS*. (TAS. MUS. REG. NO. D 589.)

When the revision of the basement stores of the Museum took place (previously alluded to in Part I. of this series) this skull was brought to light. At a later stage the mandible also was found. Fortunately, the records relating to the specimens could be traced, and the following facts show the locality and date whence the skull was obtained.

The Museum records show that this skull (classified as *Epiodon chathamensis*) was presented by J. Boyd, Esq., in 1868. It was obtained at Port Arthur (on the South-East Coast of Tasmania). Apparently the specimen has been stored away for fifty years, and the knowledge of this species' occurrence in Australian seas withheld from the scientific world for a corresponding period.

OSTEOLOGY.

Skull.

Before attempting to discuss the osteology of this specimen, it is necessary to point out a homological error that the late Sir Julias Von Haast fell into, in his paper on *Epiodon Nova-Zealandia* (7a), which is a synonym of *Ziphius cavirostris*, as already pointed out. This published statement of Von Haast's has been copied by other authors, without question, and, therefore, it is necessary to correct it, the more so as he cited Prof. Owen as his authority, while Owen's writings do not substantiate, and.

(7a) Trans N Z Institute, Vol. 9, p. 420.

(7b) In connection with the New Zealand specimen of *Ziphius cavirostris* in the Canterbury Museum, we desire to express our thanks to Mr. R. Speight, the Curator of that Institution. In order to assist us with the comparative osteology, Mr Speight had several excellent photographs taken for our benefit These were of material assistance to us, and we, therefore, have pleasure in placing on record our appreciation of Mr Speight's action in this matter in fact, contradict it! Von Haast says:—"The pre-frontals (of Owen) begin 6.50 inches from the anterior point of "the rostrum." This is the *vomer*, and was never called anything else by Prof. Owen. Owen's use of the words *pre-frontals*, as applied to whales, can only be understood by recalling the fact that he restricted the word *ethmoid* to the nasal sense capsules, and the term pre-frontals to the whole of the ethmoidal elements that remained. Now let us look for Owen's *pre-frontals* in the toothed whale. In his description of *Orca brevirostris* (cited by Gray) (8a), Owen says:—"The *vomer* extends to within 1¼ inch of the "end of the pre-maxillaries, and behind these intervenes "upon the bony palate between the maxillaries, along a "strip of 2 inches and three lines across the broadest part. "This palatal part of the vomer is the lower convexity of "the canal formed by the spout-shaped bone; the hollow "of the canal is exposed at the upper interspace of the "pre-maxillaries. Here also is seen 2 inches *behind* the "fore end of the *vomer* the rough, thick anterior border "of the coalesced *pre-frontals*, which contracts as it passes "into their upper border, forming the septum of the nostrils, expanding below and behind to form the back "wall of the nasal passages."

It will be obvious that Owen here uses the terms *vomer* and *pre-frontals* for the bones named by Flower, *vomer* and *ethmoid*, and also that while the *vomer* extends forward almost to the tip of the beak, the *ethmoid* or *pre-frontals* are enclosed by the *vomer*, which latter is drawn backwards at the base of the skull to cover the spheno-sphenoidal suture. As touching the nasal cavity, the nasal moieties of the *vomer* extend nearly half-way to the vertex, and here coalesce with the *ethmoid* or *pre-frontals*, whichever we care to call them.

True, in his exhaustive monograph on the *Ziphiidæ*, missing this point, says (Bulletin 73, U.S. Nat. Mus., pp. 50 and 51):—"The proximal end of the *vomer* is ankylosed with the anterior face of the nasals, and reaches up "to the nasal bosses, etc." This should have been the proximal ends of the pre-frontals, ankylose with the anterior face of the nasals.

As a second proof that Owen never confounded the vomer with the pre-frontals, he says at p. 425, of his Anatomy of the Vertebrates, Vol. 2:—"The pre-frontals in the *Beluga* are large, and ascend into view at the back part of the nostrils, where they coalesce with the frontals." This is the common condition in the order *Delphinidæ*,

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(8a) Gray, Brit. Mus., Cat. Seals and Whales, p. 285.

and as the pre-frontals at times (as we will deal with in a later paper) coalesce with the nasals, it is wise to call these bones—so marvellously reduced in size—*pre-fronto nasals*. In our skull of *Ziphius cavirostris* the pre-frontals do not reach the nasal bosses by an interval of 30 mm. in the medium line, a condition of things always found bridged in dolphins' skulls by cartilage (8b), until late in life, after which ossification takes place. A glance at the Tasmanian skull is enough to show that a cartilaginous bridge existed there also, but was lost by cleaning and bleaching.

This note of immaturity in our skull takes us naturally to another point, viz., the non-ossification of the ethmo-vomerine cartilage, which apparently is also dependent upon age factors, and not sexual ones. Culling a note from the human subject, we find that the ossific centre that gives rise to the ethmo-vomerine cartilage (as far as it is touched by ossification), the *crista galli*, and the cribriform plate does not complete its activities until half the period of adolescence has been passed. In whales, the sense of smell has atrophied, and the ossific powers of the centre named turns its activities upon the ethmo-vomerine cartilage—in the ziphoid whales—but apparently not till late in life. In most of the *Delphinidæ* the cartilage remains as such throughout life, but in very old dolphins it may manifest some ossification at its proximal end.

This question of the reduction of the senses in whales is one of the things that warrants considerable attention being paid to it, if we are to unravel the complexities that surround the group origins of the *Cetacea* as a whole. Briefly it may be said in passing that the retention of the nasal organs in whales cuts them off from dolphins, and that the *Ziphiidæ*, to some extent, are midway between them. To bring our specimen into line with the ten ziphoid skulls that True listed, and monographed, we will here quote the description of the specimen that comes nearest to our own, viz., his specimen No. 20971. This was the skull of a female whale that was captured at Barnegat, New Jersey, U.S.A. Of this True says:—"Adult female. " Majority of sutures open, but those on superior surface " of rostrum between maxillæ and pre-maxillæ partly anky- " losed. Vomer nearly all ankylosed to rostral portion of " pre-maxillæ. It presents a slight median elevation, but " there is *no mesirostral ossification*. Right pre-maxillæ " in front of nares flat and horizontal; left, nearly so, but " with a quite broad longitudinal groove. Opposite maxil-

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(8b) We have evidence as to the origin of this cartilage, and shall in due course deal with the same.

"lary notches, pre-maxillæ nearly on a level with adjacent "parts. Orifice of anterior nares level with the lower "end of the nasal boss. End of rostrum quite acute and "broader than deep. Rudimentary alveolar groove dis- "tinct distally. Proximal end of vomer (*Sic!*) is anky- "losed with anterior face of nasals and reaching up to "nasal boss, which has a sharp median ridge completing "the nasal septum superiorly. Anterior face of nasal "boss slightly concave on each side of the median "line." (9) In our skull the alveolar groove can be traced throughout its length, but everything else is duplicated in True's description. Apparently this American animal was slightly older at the time it came ashore than our specimen was when captured in Tasmania, for the reason stated, when dealing with the cartilaginous bridge between the pre-frontals and the other elements at the vertex of the skull. In the matter of the ethmo-vomerine cartilage, both skulls yield similar evidence, and in a word True's data makes it absolutely manifest that the ossification of the rostral cartilage has been pushed to an extreme point, as a factor of taxonomy, since the real truth is that it may or may not ossify, and if it does, it is usually late in life in the female sex—but slightly earlier and more strongly in the male. There is a temptation to hazard the guess that the almost total reduction of the dental apparatus in ziphoid whales and the consequent diversion of nutriment and nerve energy to a more central line may have had something to do with the extra ossific energy that acted upon the ethmo-vomerine cartilage. At the tip of the beak, upon the right side, there is a foraminal groove, most likely vestigial, and obviously the remaining one of a pair, that at one time were functional. This groove ended about an inch from the functional foramen that passed facial nerves to the beak during the life of the individual under study. The alterations to the beak areas by the reduction of the tooth line and its alveoli have caused the nerves to traverse the beak superficially and the bony tissue is grooved to receive them. A very slight pressure upon the probe (10) that was passed into the vestigial canal caused it to carry through and appear in the fossa in front of the functional foramen. These canals are functional (and symmetrical) in dolphins' skulls, and apparently relate to the teeth. In the higher mammals the vomer and its incidental pressure upon part of the septal cartilage determines the amount that ossifies—extra pressure causing reduction and suspension of the ossific activity. The skulls of the ziphoid whales are loosely constructed, and the ethmo-vomerine cartilage would accordingly receive far less pressure than obtains among the *Delphinidæ*. This is merely a suggestion in passing, and is not regarded by us as being more than a tentative note.

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(9) True, Bull. 73, U.S. Nat. Mus., pp. 50-51.

(10) This probe was at the time it appeared externally 17½ inches through the bony tissue of the beak.

Owing to mutilations in our skull, we are unable to compare the whole of True's cranial measurements with our specimen, but a considerable number are hereunder appended, and none of these involved any restorations. If, by the most careful deductions that can be made by comparative osteology, we restore the mutilated portions of our skull, we find them to fall into line with True's data in a most remarkable way, and even a casual glance at the table supplied will show the similarity of the two specimens.

Some of the mutilations referred to, as, for instance, the sawing off of the occipital condyles and part of the occiput, evidently pre-dated the gift of the skull to the Museum, but the loss of the pterygoids, ear bones, and all the teeth suggests unfair usage in the days when this and other whales' skulls were left to weather in the backyard, owing to want of proper storage space.

AMERICAN AND TASMANIAN SKULLS OF *ZIPHIUS CAVIRÒSTRIS.*

Name of the measurement made.	True's American specimen.		Tasmanian specimen in Hobart Museum.		Remarks.
	MM.	Inches.	MM.	Inches.	
Total length	945	37⅜	890	35	Our specimen is devoid of occipital condyles.
Length of the rostrum ...	550	21¾	540	21¼	Our measurement is from the pre-orbital foramen to tip of beak.
Breadth between centres of the orbits	476	18¾	465	18¼	
Breadth between zygomatic processes	503	19¾	485	19⅛	
Breadth between temporal fossæ	302	11⅞	297	11⅝	
Breadth of rostrum at its base	307	12¼	307	12¼	
Rostrum in the middle (width)...	112	4⅜	102	4	
Width of pre-maxillæ at the same point ...	62	2⅜	54	2⅛	
Depth of rostrum at middle	77	3*	77	3*	*Approximately.
Breadth of the pre-maxillæ in front of nares...	176	6⅞	166	6½	
Greatest breadth of anterior nares	76	3*	70	2¾	*Approximately.
Greatest length of temporal fossæ	143	5⅝	145	5 11-16	True gives the mandibular symphysis of another skull as 170 mm., and one at 176 mm., the latter being, upon the whole, the most reliable, as it was of the same species, but a male instead of a female.
Greatest depth of temporal fossæ	80	3⅛	80	3⅛	
Anterior end of orbit to the maxillary notch ...	82	3 3-16	82	3 3-16	
Length of the mandibular symphysis	No data		170	6⅝	

GENERAL NOTES.

The *Ziphiidæ* manifest a primitive character that has apparently less in common with the *Prozeuglodonts*, than it has with the hypothetical generalised, ungulate progenitor of Professor Flower. This is the presence of both a malar plate (as well as the jugal style common to dolphins) and a lachrymal bone, of extensive area. Nothing akin to this is found in the carnivora, but the like is common to existing ungulates, and in the genus BOS, the malar plate overlaps the lachrymal in a similar way to that obtaining in the cetacean skull. The lachrymal is always an important face bone in ungulates, being, where necessary, modified to meet the needs of the scent glands, but in the hippopotamus, which Flower regarded as the nearest living congener of the pro-ungulates, the lachrymal is a fairly solid plate-like bone, well up to the middle line of the face.

Our illustration of the skull is sufficiently good to supply all the ordinary data for a comparative study of *Ziphius*, with other whales, but it may be wise to add the following notes:—

1. The overhanging pre-fronto-nasal bosses, of *Ziphius*, cut it off from *Berardius*.
2. The shorter and stouter skull segregates it from *Mesoplodon*.
3. The males, according to True, have—in addition to the ossified rostral cartilage—wide narial basins, and teeth with roots 25 to 30 mm. across, as against 10 to 14 mm. for females.
4. Ziphoid whales have lower jaws longer than the upper, by anything up to 60 mm.—measured in position.
5. The pterygoids are extremely large and thin, but in our skull they are sadly mutilated.

NOTES TO STUDENTS.

(1) The origin of the Cetacea is not a solved problem, and, in spite of a vast amount of writing in this direction, even the group origin still awaits solution. Any information that can be culled from the crania of the existing whales (that relates to the pro-mammalian skull) should be useful data, and years ago Mr. Scott set out to prepare Dolphins' skulls by a long and roundabout process, having for its object the preservation of cartilaginous and imperfectly ossified vestiges, that are not commonly pre-

served in Cetacean skulls as prepared for museum specimens. In dealing with the Tasmanian Dolphins such data as we have collected will be passed in review.

(2) In times past the Ziphoid whales must have visited the shores of Tasmania, much as they do to-day, and it is of interest to note that, in this connection, the miocene strata of Table Cape has yielded an arm bone and some mutilated vertebræ of one of these whales. Although obviously nearer to *Ziphius* than to the genus *Mesoplodon*, it does not fit in with either genus, and it may be possible to extract more material from this specimen than that already published in the proceedings of the Royal Society of Tasmania in 1913. For the present, it is of interest to note that these ancient whales have a place upon our Tasmanian lists that relate to the Natural History of the past.

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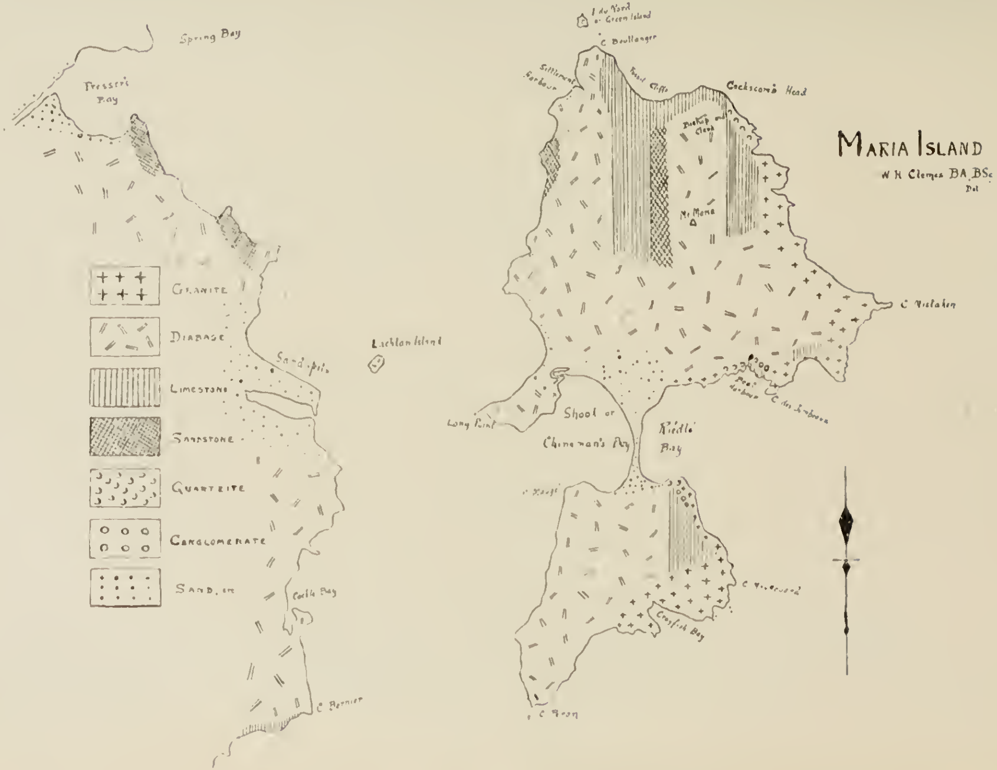
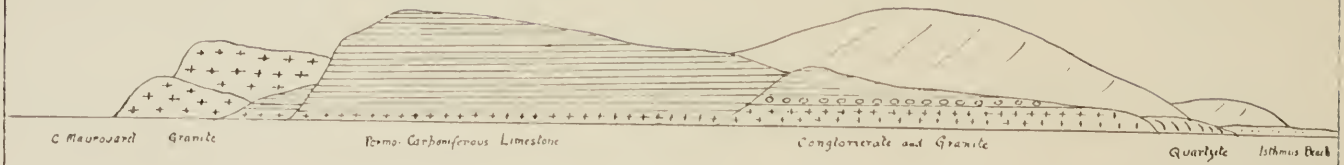
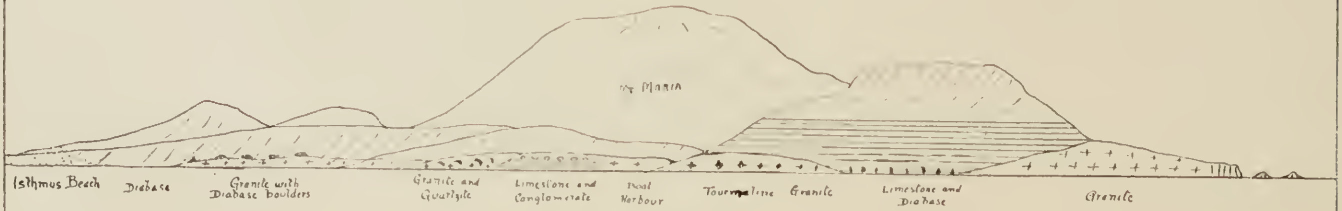
Plate XI.


MARIA ISLAND
W H Clemes BA BSc Del
Spring Bay
Prosser's Bay
Sand-pits
Lachlan Island
Castle Bay
C Bernier
GRANITE
DIABASE
LIMESTONE
SANDSTONE
QUARTZITE
CONGLOMERATE
SAND, etc
I du Nord or Green Island
C Boullanger
Settlement Harbour
Fossil Cliffs
Cockscomb Head
Bishop and Clerk
Mt Maria
C Peron
Long Point
Shoal or Chinaman's Bay
Riedle Bay
Reef
C des Tribunes
C Peron
Crayfish Bay



SOUTH RIÉDLÉ BAY MARIA ISLAND

W.H.C. del



NORTH RIÉDLÉ BAY MARIA ISLAND

W.H.C. del

NOTES ON THE GEOLOGY OF MARIA ISLAND.

By W. H. Clemes, B.A., B.Sc.

Plates XI., XII.

(Received 2nd June, 1919. Read 14th July, 1919.)

These notes are intended as an incentive to future study rather than as a complete record of the geology of this interesting locality. They are the result of several holidays spent on the island, and particularly of two yachting trips undertaken recently. In many places the record is meagre, as I was unable to land and examine the rock formations in detail, but had to rely on observations made while sailing along, often in somewhat troubled waters. Still the description is complete enough to be of value, especially as no previous record has been made, with the excepton of the late R. M. Johnston's description of the Fossil Cliffs in his Geology of Tasmania. There is brief mention of a paper read by him before the Royal Society on Riédlé Bay, but unfortunately it was not printed and his valuable observations have been lost.

Maria Island is situated on the East Coast, almost opposite to Spring Bay and Orford. The passage between it and the mainland varies in width from three to eight miles. In the narrowest part, off Long Point, is Lachlan Island, a small diabase rock covered with sparse vegetation. This passage is the result of excessive wave-erosion acting on the sandstones and diabase which are now found fringing either shore. There is little doubt that the Orford sandstones were once continuous with the sandstones at the Crayfish Rock, a little to the south of the Settlement, and those on the flank of Mt. Maria. The passage itself is extremely shallow with a moderately flat floor, the average depth being about six fathoms. A shoal stretches across from the Sandspits to beyond Lachlan Island, the water on which is in places only one fathom in depth. The sediment here deposited was largely brought down by the Sandspits River, which has, at the same time, built up a large alluvial flat and ti-tree swamp covering many acres. The ti-tree is growing on soft oozy mud, which quivers and shakes as one passes over, and it is quite easy to shake a considerable area and make the trees bob and curtsy in a rather alarming fashion. There is a fine beach here ending in a long sandy hook. In northerly and southerly weather an ugly sea gets up quickly owing to the shallowness of the water.

Maria Island is one of those curious "tied-islands" to be found in Tasmania. The reason for their formation has not yet been determined, though it is usual to ascribe it to the sinking of the land, and, though not sufficient data has been collected to dogmatise on the matter, there is no reason to suppose that there have been any other forces in operation. It is interesting to note that at the present time the shore is sinking both in Shoal Bay and also at Orford, on the opposite side of the passage. The same thing is taking place near the mouth of the Huon at Garden Island Creek, and at Kelly's Basin, Port Davey. The isthmus is narrow, low-lying, and sandy, and scarcely raised above sea-level. Shoal Bay is very shallow, though there is a deep channel off its south-western extremity. At the head of the bay is a beach, the sand of which is largely composed of shell-fragments. Riédlé Bay is much deeper, and well secured by the south-easterly gales. Its beach is composed almost entirely of quartz grains from the granites that fringe its shores. The most prominent feature of the North Island is the great central mass of Mt. Maria and the Bishop and the Clerk, the highest point of which is about 3,000 feet high, and from which the land slopes, in parts precipitously, in parts gently, down to the sea. High hills also cover the South Island, which is smaller and not so elevated. The coast line is most irregular with high cliffs on the north, south, and east, and low-lying rocks to the west, interspersed with fine white beaches.

The densest vegetation is to be found on the slopes of Mt. Maria, especially on the east where it intercepts the breezes from the sea. Here the Oyster Bay pine is a prominent feature. The rest of the island is well-wooded with eucalypts and she-oaks, though thinning out on the poorer soils of the granite areas.

The geology of the east is quite distinct from that of the west. The rocks on the western half of the island are almost entirely made up of Mesozoic sandstone and diabase of the usual type, while on the east Permo-Carboniferous mudstones and conglomerates are interspersed with Devonian granites and older quartzites. The south-western end of the island, Cape Péron, ends in a magnificent pillar and archway of diabase, from which it runs back to a pyramidal peak above. The diabase continues in a north-easterly direction as a steeply-sloping and precipitous hill-side for about a mile where it junctions with the granite of Barren Head. This forms bold headlands and rocky islands round the coast to Riédlé Bay and Cape Maurouard. It is generally massive in formation, but varies in places and becomes highly jointed and, in consequence, much hollowed by the waves, Sea Elephant or Crayfish Bay being a notable example. As far as I could judge the granite was of the usual type, though somewhat coarser grained, in which orthoclase felspar predominated, giving it a distinct reddish tinge.

Riédlé Bay is of surpassing interest to the geologist as well as to the artist and the lover of beauty in Nature. The granites of Cape Maurouard are succeeded by Permo-Carboniferous marine mudstones. These first appear as a narrow band lying horizontally on the low coastal cliff of granite but rise later to a cliff, beautifully laminated, fully 100 feet in height, extending for about a mile along the shore and resting on a shelf of granite. Later the mudstones disappear, the granite rises up to a cliff about 40 feet in height, on which is resting a narrow layer of coarse pebbly conglomerate, of which mention will be made later on. Then the granites give place to earlier quartzites, which have been tilted up on edge and otherwise deformed by the intruding granite. The highly crystalline nature of this rock testifies to the intensity of the metamorphosing action. With the limited time at my disposal I was unable to collect sufficient material to determine the age of these rocks, and can only say that they are earlier than the granite. The rocks in the same meridional line to the north are given in the Geological Map of Tasmania as Silurian, and there is no reason to suppose that these are of an earlier horizon than that. They form the outer edge of a well-sheltered corner, whose beach continues over the isthmus to the northern side of the bay. Here it is met by an immense heaped-up pile of boulders, mostly of diabase, an eloquent tribute to the force of the southerly gales. The diabase is again succeeded by a very coarse-grained granite, on the top of whose wave-worn surface are stranded great diabase boulders, which at first sight appear to have been hurled there by the force of the waves, but later examination leads one to suppose that they are either a talus from the high diabase cap of Mt. Maria behind, or perhaps a small sill or dyke sent from the same source. As we approach Boat Harbour there appears to be another occurrence of the quartzites which were found on the opposite side of the bay. Here they are resting on the granites but tilting steeply southwards. These are succeeded by the gritty basal beds of the Permo-Carboniferous series with its embedded ice-borne detritus. Above there is a magnificent cliff of conglomerate about 40 feet high consisting of pebbles and boulders set in a matrix of calcareous and felspathic sandstone, which has decomposed by the action of percolating water and formed numerous stalactitic growths descending from the overhanging projections. The pebbles are mostly quartzose, ranging in size from the tiniest particles up to large boulders, interspersed with boulders of granite and pieces of slate, schist, and quartzite of the older formations. It is resting in a kind of pocket scooped out in the granite, and is no doubt contemporaneous and homogeneous with the conglomerates across the bay. A dyke of diabase comes right through the middle and a sill of the same material is resting on the top. The granite of Boat Harbour is a very coarse-grained tourmaline granite of handsome appearance. The felspar crystals which predominate are often two to three inches long, and the crystals of the other constituents are correspondingly large. This granite should make a valuable commercial product quite equal to any of the imported article. It is very striking in appearance and should take a splendid polish. It is by far the finest granite I have seen on the East Coast. It extends round Cape des Tombeaux and passes under the Permo-Carboniferous basal beds which appear in the next little bight, and which are themselves capped by Cretaceous diabase which forms an overlying spur from Mt. Maria. Between the next point and Cape Mistaken, usually known as Ragged Head, the granite has suffered a certain amount of deformation, but whether during consolidation or subsequently is hard to determine. The jointing is most irregular and in places highly contorted. Around Cape Mistaken, a bold granite headland, we come in sight of a magnificent panorama. The great mountain-mass of the Bishop and the Clerk here approaches the sea, and slopes precipitously from its summit down to the water's edge. It consists of Permo-Carboniferous limestones and marine mudstones, resting on a bed of granite, and capped by Cretaceous diabase exhibiting columnar structure in the cliffs along its summit, forming the cockscomb-like Bishop and Clerk.

Right under the eastern end of the latter mountain the granite gives way to a series of rocks which Dr. Clarke informs me are quartzites. These will probably then be of the same horizon as those of Riédlé Bay. They have been highly contorted by the intruding granite; anticlines and synclines are frequent and the plications are most intricate. Where not folded the strata are all standing on edge. Great blocks are also to be seen embedded in the granite, showing conclusively that they belong to an earlier age, but to what age is a matter for future investigation. Permo-Carboniferous limestones are resting unconformably above them, and, on the far side, come down below sea-level, the granites having finally disappeared. They continue round the corner of Cockscomb Head and form a huge semi-circle of cliffs extending almost to Cape Boullanger and the Ile du Nord, which are of diabase. These cliffs are the finest example of the Lower Marine beds that we have in Tasmania. They are regular and almost horizontal, though one or two examples of lenticular deposition are apparent. There are no striking examples of faulting or deformation such as appear at Eaglehawk Neck and other localities. The cliffs slope down gradually to the west from a height of about 1,000 feet, with flat ledges underneath almost buried in a huge talus of fallen blocks, some of which weigh many tons. These rocks and the cliffs around them are studded with fossils, brought into relief by weathering, and are simply one solid compact mass of shell-remains, among which the Eurydesmas with their thick globose forms predominate. "Blocks of 40 and 50 tons weight seem to be simply made up of a compacted conglomerate of this genus" (R. M. Johnston). The basal beds are the usual gritty mudstones more highly studded than usual with ice-borne detritus; some of the granite blocks embedded in the mud of this old sea-floor must weigh many tons. Their angular nature shows that they have been transported by ice-action, as that is the only agency which could have carried them for such a distance and preserved their shape intact. The way in which the surrounding mud has been pressed up around their edges also proves that they have been dropped from melting floes and sunk to their present resting place.

Three zones are represented:—

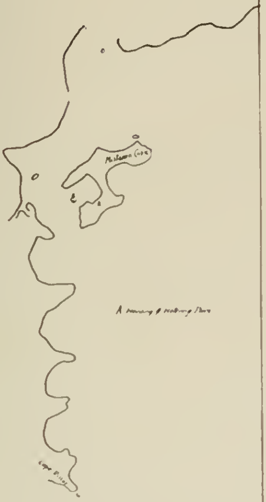
1. Eurydesma Zone.
2. Fenestella Zone.
3. Crinoidal Zone.

The first two zones have been well described by the late R. M. Johnston in his Geology of Tasmania and so I need not elaborate on them here.

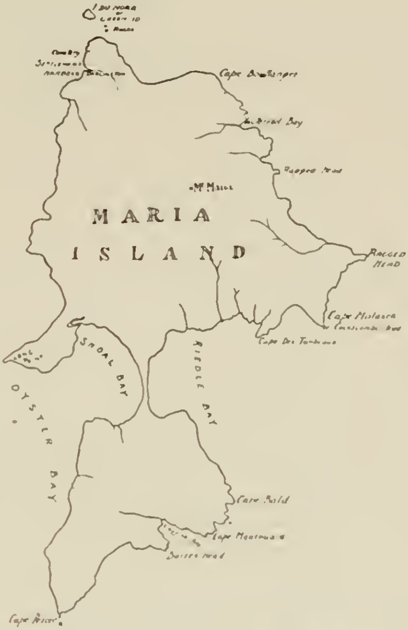
The principal families represented in the first zone are *Spirifers*, *Pachydomus*, *Eurydesma*, *Notomya*, *Aviculopecten*, *Stenopora*, and *Favosites*. In the second the *Fenestellas* and *Protoretepora* are interspersed with *Spirifers*, *Productus*, *Strophalosia*, etc. The Crinoidal Zone is composed almost entirely of a compacted mass of

Crinoid remains. No traces of the flower-like head have been found but fossils of the main stem and branching arms are very frequent. It would appear as if these remains had collected on some outlying reef where the waves had broken them up into fragments and destroyed the softer parts. It makes a splendid crystalline limestone, exceeding hard to quarry out, which was at one time worked for lime, but the collapse of the kilns led to its abandonment. The limestones seem to persist along the western base of the mountain, and resting on them is a band of Mesozoic sandstones, and above those the diabase cap so frequently found in Central and South-Eastern Tasmania. Frequently between the limestone and sandstone is a band of Permo-Carboniferous gritstone.

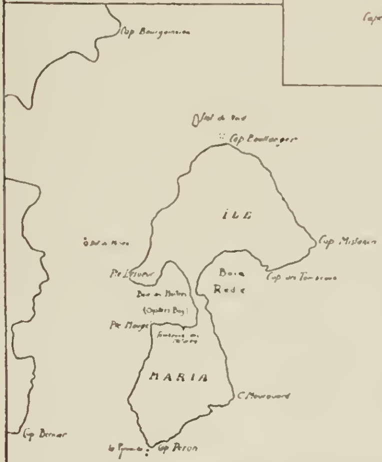
The only other feature of interest is a curious reddish coloured stone appearing under the diabase near the jetty at Shoal Bay, and at Bloodstone Point on the other side of Long Point. It has the appearance of a highly decomposed granite. If so, it is the most westerly exposure on Maria Island.



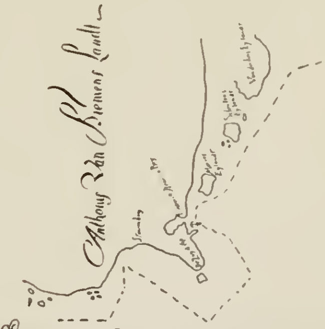
SKETCH FROM COX'S CHART (1789)



SKETCH FROM LANDS DEPT MAP (1918)



SKETCH FROM BAUDIN'S (FREYCINET) CHART - (1802)



SKETCH FROM TASMAN'S CHART (1642)

THE EARLY HISTORY OF MARIA ISLAND, EAST COAST, TASMANIA.

By Clive E. Lord.

(Curator of the Tasmanian Museum).

Plate XIII.

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Historically speaking, the discovery of Tasmania is of recent date, but even so, we lack many details of the early expeditions, and there were probably many early navigators of Australian seas of whom we know nothing. Even in modern days, navigation is not exempt from danger, although all the main routes have been carefully charted, and the advent of steam power has revolutionised the art of seamanship. The early explorers, however, sailed their small vessels along unknown coasts, and amidst uncharted reefs. How many perished we know not, but even of those expeditions that returned a large percentage of their company were lost by the way. Scurvy was responsible for a tremendous death roll, in addition to the other dangers of the voyage. It must also be remembered that the discoveries of many of the early explorers were not made known to the world for many years. Each expedition was working for its own country or company, and in some cases the results of the voyages were carefully guarded for the sake of self interest from a national standpoint. It was not for many years after his death that Tasman's work as an explorer became known, and the details of his stay at Tasmania, and incidentally the discovery of Maria Island, were given to the world.

The exploring ships coming from the west—the more settled portions of the old world—nearly all followed on Tasman's tracks. Making their landfall on the rugged coasts of the south-western portion of Tasmania, or, as it was known of old, as the southern portion of Terra Australis, and then sailing east until they reached the quieter waters of our east coast. Maria Island will always be connected with the early era of discovery, and the more one visits this locality, the greater the desire becomes to gain some knowledge of its early history. This was so in my own case, and what information I have gathered has been incorporated in the present paper in order that others who are interested may have the information available should they desire to take advantage of it.

As far as European navigators are concerned, Maria Island was first sighted on the evening of December 1st, 1642, when Abel Janszoon Tasman sailed up the East Coast and anchored near Green Island, to the south of Marion Bay. This anchorage was about fifteen miles to the southward of Maria Island, which Tasman named. The intrepid Dutch explorer left this anchorage on December 4th, and his chart shows that he sailed up the coast on the ocean side of the island, which he charted as "Maria's Eylandt." (1)

For more than one hundred years the aboriginals were undisturbed by visitors from overseas. On March 5th, 1772, however, the ill-fated Marion du Fresne, following on Tasman's charts, anchored his vessels in almost the same locality as where the *Heemskirk* and *Zeehan* had been a century previously. Marion remained for five or six days, during which time there occurred an unfortunate encounter with the natives, in which several of the aboriginals were wounded, and at least one killed. Crozet's narrative of the voyage (2) does not give details of their stay, but it is probable that boats from the ships visited the island. (3)

The third European and the first British navigator to sight Maria Island was Furneaux, but he was in error as regards the position of the island, and probably mistook the Maria Island of Tasman for part of "The Schoutens." Captain Cook, in the *Resolution*, and Captain Furneaux, in the *Adventure*, became separated in a storm on the 7th of February, 1773. This was Cook's second voyage to the South Seas, and he sailed to New Zealand, while Furneaux called in at Adventure Bay before rejoining his captain. On the 9th of March, Furneaux sighted Tasmania, or, as it was then called, the south coast of New Holland. He mistook the points, and took the entrance to the present D'Entrecasteaux Channel to be Storm Bay. When he first anchored on the 10th of March, he thought he was near the Frederick Henry Bay of Tasman, and it is this error which led to such subsequent confusion. Furneaux called the bay Adventure Bay, after his ship, and considered Tasman's Frederick Henry Bay to be a few miles north. The present Tasman's Peninsula was called by Furneaux the Maria Island of Tasman. His description of the anchorage in Adventure Bay is as follows:—

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(1) Tasman, Abel Janszoon.—Journal of a Voyage in 1642 Amsterdam 1898

Maria Island was named after the wife of Anthony Van Diemen, the Governor of Batavia, and not after his daughter, as is often stated.

(2) Crozet's Voyage to Tasmania, New Zealand, etc., 1771-72 Trans. by Ling Roth. Lond. 1891.

(3) See Copies of Marion's Charts. P. and P. Roy. Soc. Tas. 1889.

"At seven o'clock in the evening we anchored in "seven fathoms of water, with the small bower, and "moored with the coasting anchor to the westward, "the North point of the Bay N.N.E. ½ E. (which we "take to be Tasman's Head), and the Easternmost "point (which we named Penguin Island, from a "curious one caught there (4)) N.E. by E. ¾ E.; the "watering place W. ½ N.; about one mile from shore "on each side; Maria's Island, which is about five or "six leagues off, shut in with both points; so that you "are quite landlocked in a most spacious harbour." (5).

Furneaux stayed five days in Adventure Bay, and having completed taking in wood, water, and grass, he set sail. He records passing "Maria's Islands" on the 16th, and the Schoutens Islands on the 17th, and after proceeding further north he stood away to New Zealand. (6) Furneaux's mistakes led to considerable confusion, and even at the present time the result of his investigations may be seen in the misleading nomenclature, which is still in general use.

Captain Cook, during his third voyage in 1777, anchored in Adventure Bay in January of that year. He failed to notice Furneaux's error, as he records bearings from his anchorage in Adventure Bay to the points of "Maria's Island."

The first detailed examination of the island was made by Captain John Henry Cox, during a voyage in the brig *Mercury*, in 1789 (7). On the 3rd of July he sighted the coast of Tasmania, and at one p.m. was abeam of S.W. Cape (8). At six in the evening the brig was brought to anchor in a deep bay (9), the Mewstone bearing S. by E. A little water was obtained, and signs of the natives were seen. A heavy sea set into the bay on the morning of 5th July, and some difficulty was experienced in weighing the anchor, owing to an accident to the winch, which injured several of the crew. The cable was eventually cut, and the anchor left behind. At nine the next night the boat was off Tasman's Head, and on the night of the 7th they worked to windward, and imagined they were working into Adventure Bay, where it was proposed to secure wood, and complete taking in water. When day dawned, however, they found that they were farther north than they imagined, and "were among the Maria Islands." At 8 a.m. Cox set out in one of the small boats, and examined the shore to the South West in search of fresh water, but he did not meet with any more success than Marion had. Later he examined Maria Island, and landed in a deep bay, with a fine sandy beach. Cox named this Oyster Bay. He found a small stream of water, and plenty of good wood in the south east corner of the bay, which is situated between the North and South portions of the island, a low sandy neck being the only connecting link at this place. The brig was signalled to, and came to anchor in the bay at 3 p.m. on the 8th of July, 1789. The crew were immediately sent on shore to procure wood and water. They found traces of human inhabitants, as the trees were hollowed out by fire, and great quantities of shells heaped about them. They also noticed roughly constructed huts of bark.

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(4) "Probably the first record of *Eudyptes chrysocome* (Crested "Penguin)."

(5) Cook's Voyages

(6a) Cook's Voyages.

(6b) Forster, in describing Furneaux's anchorage in Adventure Bay, states:—"Several islands in the offing to the N.E. along shore were of moderate height, and likewise covered with wood. Tasman probably took them for one great island, which in his charts bears the name Maria's Island." A Voyage round the World. Dublin. 1777.

(7) Cox's voyage was undertaken for motives of discovery, but an examination of the fur trade of the N.W. Coast of America was its ultimate object. The *Mercury* was a copper bottomed vessel of 152 tons, designed and built by Stalkaart especially for the voyage.

(8) In 1773 Furneaux had mistaken S.W. Cape for Tasman's South Cape

(9) Now known as "Cox's Bight."

On the 9th smoke was seen on the opposite side of the bay, and an attempt was made to interview the natives. The third mate approached them, alone and unarmed, and although he made every sign of friendship his fancy could suggest, they only mimicked his actions exactly, and laughed heartily, but would not stay. As fast as he advanced they withdrew, and were soon lost in the bush. On the morning of July 10th, the natives were again seen, several standing about a fire, while others were walking in the bush with spears and lighted pieces of wood in their hands. They allowed the seamen to approach, but seemed very timid, although they accepted gifts of biscuits, penknives, etc. This party consisted of 14 or 15 men or women, who were all entirely naked "except one "man, who had a necklace of small shells, and some of the "women, who had a kind of cloak or bag thrown over "their shoulders." Several were observed to be scarred, and their bodies daubed with reddish earth (10). Mortimer sums the natives up thus:—"Upon the whole they seemed "to us to be a timorous, harmless race of people, and "afford a fine picture of human nature in its most "rude and uncultivated state."

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(10) There is a large outcrop of reddish earth at Bloodstone Point to the north of Long Pt., to the N.W. of Oyster Bay, which might have served the natives of this locality for the usual red ochre with which the aboriginals were so fond of decorating themselves.

Later in the day several of the officers went ashore, and although they found a recently deserted "camp," they did not succeed in interviewing the natives. A number of parrots were noticed, a variety of small birds, and numerous sea fowl—"particularly a large white bird, "sometimes bigger than a swan, with black tips to its "wings, and an enormous sized beak" (11). Most of the birds were very shy, from which fact it was presumed that the natives regularly hunted them.

Although it was the depth of winter (July), the weather was mild and pleasant, the thermometer keeping 51deg.-56deg. during the period the brig was in the bay.

On the 10th, having secured a sufficient stock of wood and water, and being ready for sea, "all hands "were sent on shore to wash their linen and amuse them-"selves as they thought proper." On the 11th the brig sailed, with a light breeze from the N.N.W., "out of "Oyster Bay by a passage to the southward, opposite to "that by which we came in." (12) (13)

In 1792 Admiral Bruny D'Entrecasteaux, in command of the *Recherche* and *Esperance*, anchored in the channel which he then discovered, and which now bears his name. He returned again in the following year, and while anchored near the centre of the Channel, on February 16th he sent Beaupré, the "engineer geographer," to explore the estuary of the present River Derwent, and also the shore to the Eastward. He was particularly instructed to discover "whether the island of Maria was "really separated from the land of New Holland; for "this had not been sufficiently resolved by Marion, or "even by Captain Cook." On the return of the boats, Beaupré stated that he had seen the channel which separates the island of Maria from the mainland. His charts clearly show the track of the boats and his "Chan-"nel" would be the low lying land connecting Forestier's Peninsula, for it must be remembered that Furneaux's error was now bearing fruit, and that the Peninsula was being mistaken for the Maria Island of Tasman. (14)

When Sir John Hayes visited Tasmania in 1793, in the *Duke of Clarence* and the *Duchess*, he did not explore the East Coast, his main surveys being in the Channel and the Derwent. He probably only saw Maria Island at the time of his departure for New Guinea. (15) (16).

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(11) Pelican.

(12) From an examination of the chart and the wording of this passage it would appear that the *Mercury* sailed up the eastern coast of the island and entered the strait between the island and the mainland at its northern end.

(13) Mortimer, Lieut. G.—Voyage in Brig *Mercury*, commanded by John Henry Cox.

(14) Labillardiere.—Voyage in search of La Perouse.

Bass and Flinders, in the *Norfolk*, (17) during the historic voyage in which they conclusively proved the existence of Bass Straits, were the next to sight the island. After leaving Storm Bay on January 3rd, 1799, they opened up Cape Raoul and Cape Pillar. Flinders states that "These two high columnar Capes are the extreme "points of the land which Captain Furneaux took to be "Maria's Island." (18)

After rounding Tasman's Island, the true Maria Island was sighted at 5 p.m., and they hauled in close to the shore, but the squally wind drove them off. The next morning the island appeared as if divided in two. (19) At ten o'clock the wind veered round, and they tacked towards the island, but as the day wore on the wind increased, and as it was impossible to get near Maria Island before dark, they bore away to the northward.

The next explorer to visit Tasmania was the French Admiral, Baudin, in command of the *Geographe* and *Naturaliste*. After investigating the Channel, they sent out a boat expedition towards the East, in order to discover if they could sail the ships through the strait between Furneaux's "Maria Island" and the mainland. M. Faure, the "engineer geographer" of the expedition, spent eleven days exploring and charting the coasts. He noted the misplacement of Frederick Henry Bay, and that the "Maria Island" of Furneaux, or the "Isle d'Able Tasman" of D'Entrecasteaux was a peninsula.

On the 17th of February the ships sailed out of the Channel, and about five in the evening of the 18th, anchored in the strait between the mainland and Maria Island.

At daybreak next morning the long boat was sent with orders to circumnavigate Maria Island, to make a chart of its coast, and to ascertain if there was any fresh water. The boat, which was under the command of M. Maurouard, included in its complement, M. Boullanger, geographic engineer, and M. Péron, the naturalist and historian. Skirting along the southern coast, the extremity was named Cape Péron, and the granite outcrop ahead of this the Pyramid. Progressing up the east coast, they charted the point at the southern end of the large bay Cape Maurouard, after the cadet in charge of the boat, who also assisted M. Boullanger in his geographic studies. The bay itself was named Riédlé, in honour of a naturalist of the expedition, who had died at Timor.

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(15) Lee —Commodore Sir John Hayes.

(16) The following passage *re* Risdon from Mrs. Lee's book is worth repeating:—"It has often been stated in print that the name "originated in Restdown as being the place where the first British "settlers under Lieutenant Bowen, R.N., rested after their stormy "voyage in 1803, a legend which has come to be regarded as the "truth. Risdon, however, was the second officer of the *Duke of Clarence*."

(17) The *Norfolk* was a small boat of 25 tons, built at Norfolk Island in 1798. She was built and equipped by the settlers in order to provide communication with Sydney. When the boat arrived at Port Jackson, however, Governor Hunter commandeered her for use by Bass and Flinders. In 1808 the majority of the Norfolk islanders were removed to Tasmania, hence the names New Norfolk, Norfolk Plains, etc.

(18) Flinders.—Voyage Terra Australis. Intro. p. cxc.

(19) A very low and narrow sandy neck connects the northern and southern portions of the island.

The explorers landed at Riédlé Bay about two o'clock, and it was here that Péron found the famous example of the aboriginal tomb. This was a structure of bark, covering the remains of an aboriginal whose body had been cremated.

On the 20th the boat continued its journey, passing the Cape Mistaken of Cox, and rounding the northern cape, which was named Boullanger, after the hydrographer of the expedition. The small island off the north extremity of Maria Island they named Islet du Nord. Along this part of the coast the growth of kelp greatly astonished the explorers, and considerably hampered their progress. On the western side the explorers gave the name Point Leseur (20) to the point at the head of Oyster Bay, and Middle Island (21) to the island half way between this point and the mainland.

As it was growing dark, the explorers proceeded to land, but at the sight of about thirty aboriginals, they proceeded further into the bay, and landed without being approached. The next day they surveyed Oyster Bay, and were just leaving when the sound of guns from the ship announced the fact that M. Maugé, the surgeon, was dead. (22) The boat returned to the ships on the evening of the 21st.

During the following days parties from the ship visited the island, and several interviews with the natives were held. Péron does not seem to have been impressed with the Maria Island tribe. During the time that the exploration of the island was in progress, several other parties had been sent out surveying. The first, under the command of M. Freycinet, Senior, surveyed the coast south of Cape Bernier, which they named. This expedition was absent eight days, and they showed that Frederick Henry Bay was actually situated as shown by Tasman, and that Marion Bay was only a long open bay on the ocean side of the true Frederick Henry Bay, (23) the two bays being separated by a long sandy isthmus, the only connection by water being a narrow opening at the south corner. They found that there was no appearance of the Channel shown on the charts of D'Entrecasteaux. Flinders' charts were more correct in showing Tasman's Peninsula, but his location of Frederick Henry Bay was incorrect. The northern peninsula was named Forestier's Peninsula.

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(20) Now Long Point.

(21) Now McLaughlan's or Lachlan Island.

(22) "The last of my colleagues, M. Maugé, was certainly no more, "and his remains had at that moment been committed to the earth. "He died the day after we left the ship, universally regretted by all "on board both vessels. . . . His body was interred on Isle "Maria at the foot of a large *Eucalyptus*, against which a plate of lead "was fixed, whereon was inscribed the sad particulars of his death, "and the name of Point Maugé was given to the part of the island "where the remains of our unfortunate companion are deposited." Péron.

The second boat expedition, under the command of M. Freycinet, Junior, was absent three days, and explored the East Coast, from Cape Bernier to Fleurieu Bay. This bay was so named (24) by the third expedition, which explored the Schoutens. They found that instead of the five or six islands which had previously been shown on the chart, there was only one, and that what had previously been taken for islands were the high hills of the peninsula, which are separated in several cases by low, sandy necks of land. The peninsula was called Freycinet's Peninsula.

The French devoted some time to the study of the natural history of Maria Island. They particularly remark upon the immense beds of kelp fringing the shores, the great shoals of dolphins and whales, and the "innumerable legions" of seals.

Baudin sailed from his anchorage on the 27th of February. Owing to the unfavourable weather, their progress up the coast was slow, and the ships became separated from one of the ship's boats, which had been sent out exploring near Thouin, or Wineglass Bay. (25)

On the 10th of March when bearing towards the straits a small ship was sighted which was on the way to Maria Island to catch seals. This vessel may well be regarded as one of the first of the moderns. The old era of exploration from a geographical standpoint was past and Commerce was following quickly upon the heels of Discovery. From now onward the island was continually visited by sealing and other vessels, both from the mainland and from the settlement at the Derwent. (26)

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(23) Unfortunately the true Fredrik Henry Bay of Tasman is now known as Blackman's Bay.

(24) "In honour of the illustrious scholar to whom France and "her navy are so much indebted for so many valuable and honourable "works." Péron.

(25) This boat later met the British vessel, *Harrington*, Captain Campbell, who supplied them with provisions. They fell in with the *Naturaliste* in Bass Straits, and later rejoined the *Geographe* in Sydney.

The *Geographe* also met an English Brig on the 8th March. She was named the *Endeavour*, having been built at Port Jackson. Her hull was "of the wood of the *Casuarina* and her masts of the *Eucalyptus*."

In the early years of the colony's history Maria Island was mainly used by those engaged in the whaling and sealing industry, and several localities are now pointed out which in the early days were the resort of "bay whalers."

In 1825, however, a new era began. The Government considered that the island would make an excellent convict station, as not only was it a "natural penitentiary" but appeared to be a suitable locality in which to grow flax. Particular attention was being paid to the cultivation of that plant at this time. Accordingly on the 4th of March, 1825, the first vessel sailed from Hobart with a draft of prisoners. The first Commandant was Lieutenant Peter Murdoch of the 35th Regiment, and he held office until the 26th of August, when he was succeeded by T. D. Lord, who had charge of the station for some years following. Among the early officers at the settlement may be mentioned Assistant-Surgeon J. Griffith, Storekeeper T. J. Lempriere, and Principal Overseer R. Dodsworth. The guard was composed of men of the 40th Regiment. The island, however, did not come up to expectations as far as being a natural penitentiary was concerned, for there were numerous escapes. In one instance six men vacated the island by means of a rough raft of bark, etc.

The settlement, which had been named Darlington (27) was, however, extended, and several out stations were created. In 1830 a woollen factory was erected for the manufacture of rough cloth. Two years later the cloth was one of the main productions of the station, which, it was considered, was about self-supporting. The cloth production was valued at 8s. per yard, and as on an average 100 yards were woven weekly the value, per annum, was about £2,000. In addition 4,000 pairs of shoes were made each year, which at 5s. per pair added another thousand pounds to the revenue. However, the authorities did not seem satisfied with the station, and soon after the foundation of Port Arthur (28) the settlement at Maria Island was vacated. (29)

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(26) First settlement at the Derwent—September 7th, 1803.

(27) Mr. H. Wright, Librarian of the Mitchell Library, Sydney, to whom I am indebted for certain information in this paper, considers that Darlington was probably named after Governor Darling.

(28) The Port Arthur Settlement was founded in 1831.

(29) Maria Island was vacated as a penal establishment, for the first time, in 1832.

In 1841 Lord Stanley's Probation System came into force and the station was again occupied under the new scheme for dealing with the convict population. The stttlement was extended, and in 1845 there were about six hundred prisoners on the island, these being divided into four classes. The main buildings at Darlington, in which the convicts were housed, consisted of six large rooms containing 66 men each, 20 huts of various sizes, capable of holding from 3 to 24 men each and about 100 separate apartments (30). The position at the settlement at this time does not appear to have been at all satisfactory. (31)

Among the people exiled to the isle were several of the Maori chiefs who had been concerned in the New Zealand rebellion. At a later date some were allowed to return to their native land, but one at least died on the island, for in the neglected cemetery of the old station may be seen a stone stating that—

Here lie the remains of
HOHEPA TE UMUROA
a native of Wanganui, New Zealand,
who died July 9th, 1847.

There are several other interesting epitaphs in this old graveyard, which is situated on the north-western point of the island. The spot is unfortunately much neglected and many of the graves are overgrown with boobialla. At the present rate of progress it will not be many years before all trace is lost, except perhaps for a few of the larger tombstones, of the records of those who died and were buried at the settlement of Darlington in the early days of its history.

On October 29th, 1849, the brig *Swift*, 360 tons, 6 guns, commanded by Captain Aldham, arrived at Hobart from London. She had on board several of the Irish State prisoners. Among the number was Smith O'Brien, and as he refused to accept a ticket-of-leave, Governor Denison, who had visited Darlington in January (32), decided to send him to Maria Island. Here O'Brien apparently tried every means of making a martyr of himself, and his friends devised a plan for his escape. A priest communicated the details to O'Brien (33), and he was ready when the schooner *Victoria* anchored off the coast and sent a boat ashore. Before O'Brien could reach the boat, however, a constable appeared and arrested the boat's crew at the point of his musket. O'Brien was so furious at the failure of the plan that he refused to walk back to the station, and had to be carried there by the men who had come to rescue him (34). After this O'Brien (35) was transferred to Port Arthur, and eventually he accepted a ticket-of-leave.

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(30) Boyd to Hampton, 31st Dec., 1845.
(31) Syme.—Nine Years in V.D.L., p. 270.
(32) Denison.—Varieties of Vice-Regal Life, p. 104.
(33) Denison.—Varieties of Vice-Regal Life, p. 144.

Transportation was soon to cease, however, and Darlington was finally vacated as a convict station in 1850.

There is an amusing account (36) of how the H.M.S. *Havannah*, unaware that the settlement had been vacated, put in there at Christmas time, 1850, and awaited a welcome due to such a Queen's ship. However, "the tall flag-"staff was buntingless, the windmill sailless, the pretty cot-"tages and gardens seemed tenantless, not a drum was "heard in the military barracks, and the huge convict "buildings seemed minus convicts. At length, through a "telescope, was observed one canary coloured biped, in the "grey and yellow livery of the doubly and trebly convicted "felon. . . Presently a whaleboat came slowly off and "there appeared on the quarter-deck a hawk-eyed and "nosed personage about six feet and a half high, who seem-"ed as if he had long lived in indifferent society, for his "eyes had a habit of sweeping round his person as though "he was in momentary danger of assault. This was an "overseer left in charge of the abandoned station with a "few prisoners to assist him."

This now brings us to the end of the early period of the island's interesting history and the one with which we will conclude. We have seen how the early romantic era of geographical exploration gave place to commerce as represented by the sealers and "bay whalers." And how when these men had exterminated their stock in trade the island became a home for the reformers of society—and their patients. During the century the island was to witness yet another commercial era due to the activities of Signor Bernacchi's Maria Island Company, but this is beyond the scope of our present investigations. Maria Island will always be of interest, not only from a scientific standpoint owing to its peculiar geological formation, but from the more general fact of its charming scenery and ideal climate. Closely interwoven with the other attractions of the island are the interesting facts relating to its early history. I have been privileged to recall a few of these in the foregoing pages, but there are doubtless many more even more interesting ones which I am not aware of but which will I hope be placed on record by those in possession of them before the records relating to them are forgotten. Sufficient has been written, I think, in order to show what interesting periods of history this island has seen.

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(34) Denison—Varieties of Vice-Regal Life, p. 115

(35) Some said O'Brien was betrayed. However, the *Victoria* was captured by a boat from the settlement, and the master Ellis was tried at Hobart, and his share of the vessel forfeited. In spite of this he managed to get away with the vessel. Later, some of the Irish prisoners who had reached America met Ellis at San Francisco, and an immediate Lynch law trial took place. The "jury," however, acquitted Ellis on the charge of betraying the plan of escape. Fenton, History of Tasmania, p. 216.

(36) Mundy.—Our Antipodes, p. 174.

NOTES ON THE NOMENCLATURE.

Cape Boullanger. This was named after a member of Baudin's expedition, as shown by the following passage:

> "En effet à peine on a doublé le cap Nord, qui, du
> "nom de notre ingénieur, été appelé *Cap Boullanger.*
> " . . . En evant du cap Boullanger, se présente
> "un grosse roche, qui se rattache à l'île Maria par une
> "traînée de récifs dangereux; cette roche est precédé
> "d'un gros ilot granitique, peu élevé, stérile, et qui
> "laisse entre la terre et lui un passage practicable
> "seulement pour le petites embarcations. Nous
> "l'appelâmes *Ilot du Nord.*"

On Baudin's Charts (Carte d'une parte de la Côte orientale de la Terre de Diemen dressé par L. Freycinet d'après ses observations et celles de MM. Faure et Boullanger. Février 1802). Cap Boullanger is unmistakably shown as the northern point of Maria Island, thus bearing out the description in the text. On Flinders' Chart (South Coast, sheet 6), "C. Boullanger or Coxcomb Head" appears east of its true location. The present maps issued by the Lands Department show Cape Boullanger as the point near the Bishop and Clerk. This is by no means its correct position, and it should be transferred back to its original place—the extreme north point of Maria Island, opposite the I. du Nord (37). The point where it appears on the present day maps is generally known as "The Bishop and Clerk" after the prominent mountain of that name which projects boldly seawards at this point. This is the "cock's-comb-like" head referred to by Flinders.

By some strange alteration "Coxcomb's Head," which appears upon Flinders' Charts of 1798-9 (published 1814) as a synonym of Cape Boullanger, now appears on the Lands Department's Charts as a synonym of Cape Mistaken. But even this latter Cape has been misplaced, as I shall show later.

Cape Mistaken. So named by Captain John Henry Cox of the Brig *Mercury* in 1789. The name on modern maps appears too far to the south. Péron refers to this Cape as follows:—

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(37) The I. du Nord is variously called locally "North Id.," "Green Id.," "Rabbit Id.," or "Goat Id."

> "Après avoir doublé la point Nord de la baie "Riédlé, nous vîmes la terre courir à l'E.N.E. jusque "par le travers du cap *Mistaken* (ainsi nommé par le "Capitaine Cox, qui reconnut *Oyster's Bay* en 1789), "qui forme le point le plus oriental de l'île."

Upon the present day maps of the Lands Department the most eastern point of the northern portion of Maria Island is designated Ragged Head. The same name is given to a point a mile or so North-West. A few miles to the south of this there is a point marked Cape Mistaken or Cock's-comb's Head. (On Flinders' Charts Coxcomb's Head appears as a synonym for Cape Boullanger.) There can be no doubt, after an examination of Cox's and the other early charts, that the name Cape Mistaken was given by Cox to the most eastern point of the island, and that the present position assigned to it on the Lands Department's maps is incorrect. It must further be remembered that it was after rounding this Cape when Cox discovered he was not working into Adventure Bay that he gave the name Cape Mistaken to this point.

Flinders gives (38) details of his observations when coasting along the shores of Maria Id. as follow:—

> "At daylight, Maria's Island appeared to be divided "into two, Schouten's Island was visible, and the prin"cipal bearings taken were as follow:
> "Tasman's small island (39) ... ... S. 21° W.
> "A deep bight in the coast ... ... S. 56 W.
> "South Head of Frederik Hendrik's Bay. S. 72 W.
> "Maria's Island, south part ... ... N. 64° to 43 W.
> " ——, north part ... ... N. 39 to 19 W.
> "Schouten's Island ... ... North to N. 5 E.
> "The wind shifted to north at ten o'clock, and we "tacked towards Maria's Island. At noon the north"east extreme, a cock's-comb-like head was distant four "or five miles, but the island lying off it in Mr. Cox's "chart was not visible nor yet the isthmus which con"nects the two parts of the island.
> "Observed latitude ... ... 42° 41½" S.
> "South Head of Frederik Hendrik's Bay... S. 40 W.
> "Maria's Island, south part ... ... Clouded.
> " ——, north part ... ... S. 82° to N. 64 W.
> "Schouten's Island, dist. 4 leagues. N. 3 W. to 8 E.

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(38) Flinders.—Voyage to Terra Australis. Intro. p. cxc.

(39) It must be remembered that until Flinders examined the French and later charts, after his imprisonment at Mauritius, he considered Tasman's Peninsula was an island.

> "We had squally weather in the afternoon, with wind "at north-west; and being unable to get near Maria's "Island before the evening, bore away northward, hav-"ing a fresh breeze at W.S.W."

I have plotted Flinders' position and taken into consideration his remark: "At noon the north-east extreme, a "cock's-comb-like head was distant four or five miles," and I do not think that there is the slightest doubt that the headland referred to by Flinders is the prominent projection formed where the Bishop and Clerk mountain abruptly falls to the sea. My personal recollections of the eastern aspect of the Coast strengthen this opinion. If any further evidence was desired one has to examine Flinders' own charts. On these Cape Boullanger has been moved from the low lying northern point to the massive buttress of the north-eastern promontory, and is marked "C. Boullanger or Coxcomb's Head."

CAPE MAUROUARD. Named after a member of Baudin's expedition.

> "Parvenus à la pointe de 'Est, que nous nommée "*Cap Maurouard*, du nom de l'aspirant recommand-"able qui partageoit alors avec M. Boullanger le soin "des travaux géographiques, nous vîmes la côte se "diriger au N.N.O."

On Baudin's charts (Freycinet's) the location of this Cape is clearly shown as the most eastern point of the southern portion of Maria Island. Flinders also gives it this position. On the Tasmanian Land Department's present maps the name is given to the northern point of Crayfish Bay, while the most eastern point of the southern section of the island is designated Cape Bald.

CAPE PERON. Named after the naturalist and historian of Baudin's expedition.

> "Bientôt nous atteignîmes le cap le plus Sud de "cette île, que nos géographes ont nommé *Cap Peron*. "En evant de cette cap, s' élève un rocher granitique "solitaire de 150 à 200 pieds de hauteur, déchiré par "les flots, imitant assez bien, sous ce rapport, un sorte "d'obélisque: il fut nommé *la Pyramide*." (40)

LONG POINT. This is the "Leseur Point" of the French explorers. The designation Long Point first appears on the chart of 1837. Leseur was one of the French artists.

MARIA ISLAND. So named by Tasman in 1642, in honour of the wife of Anthony Van Diemen (and not after his daughter as is often stated).

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(40) Voyage de Découvertes aux Terres Australes. Vol. 1., p. 263.

Mauge Point. Named after the surgeon of Baudin's expedition, who was buried on Maria Island at this place. Care must be taken to discriminate between Point Maugé on Maria Island and Monge Bay (now generally spoken of as Pirates Bay) on the outer side of Eaglehawk Neck. Monge Bay was also named by Baudin, but was so called after a French scientist. (41)

Oyster Bay. Named by Captain Cox in 1789, who brought the brig *Mercury* to anchor there in order to take in supplies of wood and water On present day maps the name Oyster Bay is reserved for the Outer Bay and the inner portion designated Shoal Bay (often referred to locally as Chinaman's Bay).

Riedle Bay. So named by Baudin's expedition in 1802. It was named after one of the naturalists of the expedition, who had died at Timor in 1801.

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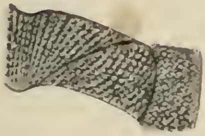
[Since the above paper was read before the Society, the officials of the Lands Department have taken a kindly interest in the question of the nomenclature, and I am glad to note that there is every prospect of the names being restored to their original positions.—C.E.L.]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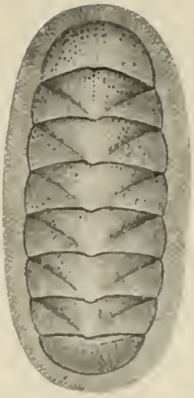
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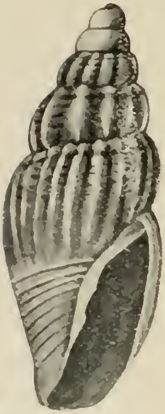
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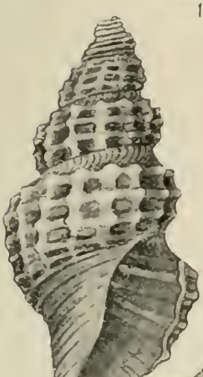
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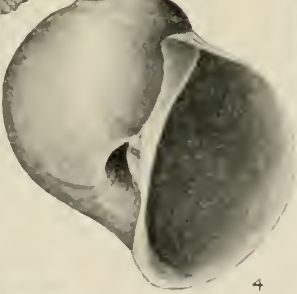
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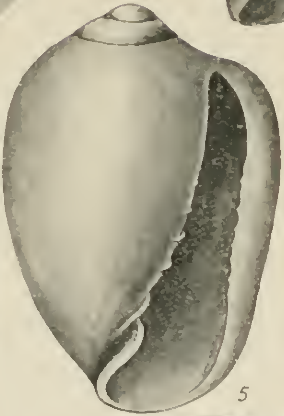
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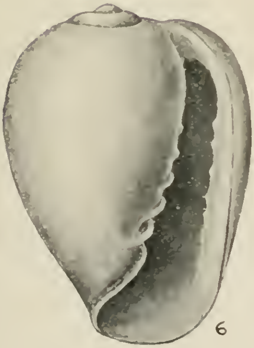
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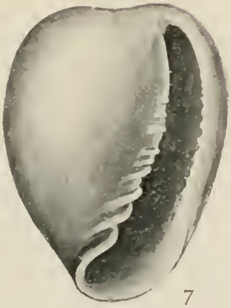
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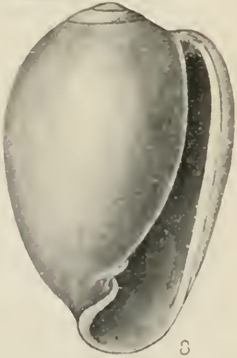
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NEW SPECIES OF TASMANIAN MOLLUSCA, WITH CRITICAL REMARKS ON SEVERAL DESCRIBED SPECIES, AND ADDITIONS TO THE LIST.

By W. L. May.

(Received 20th June, 1919. Read 11th August, 1919.)

Plates XIV.-XVII.

The species here described include no startling novelties, but are more or less closely related to previously known forms. They have come from various parts of our coasts, and from low water mark down to one hundred fathoms, and may be described as the balance from several years collecting left after more striking species have been dealt with. The types of the new species will be presented to the Tasmanian Museum.

June. 1919.

Callochiton elongatus, sp. nov.

Shell very small, narrowly elongate, girdle rather broad; rather elevated; the valves distinctly beaked. Colour—Purplish-brown, lighter on the dorsal area, giving the appearance of a longitudinal pale band A co-type has the 6th and 7th valves mostly pale green and the 2nd valve with a large whitish blotch dorsally.

Anterior valve semi-circular, slightly beaked, covered with minute pustules; median valves with lateral areas distinctly raised, the pleural and dorsal areas are not separated, except that the low pustules that cover the whole valve become finer and more longitudinal towards the ridge. Tail valve with mucro about one-fourth from the adjoining valve differentiated from the rest of the valve by a small ridge and very slightly elevated. Girdle covered with imbricating, elongated, sharp-pointed scales, and similarly coloured to the valves, but of a lighter shade, sometimes with paler blotches.

Length 7.4; breadth, 3.6 mill.

Habitat Norfolk Bay and Port Arthur (E. Mawle). Seven or eight specimens collected. This beautiful little species is a very much smaller and *narrower* shell than *C. platessa*, Gould; *C. rufus*, Ashby, the type of which I have seen, is broader still. The present species has for its size coarser sculpture than *platessa*. It varies much in colour-ing, but the ground colour seems always to be some shade of purplish-brown. It may be blotched with green and whitish in various degrees of pattern.

Pl. XIV., figs. 1a, 1b.

APATURRIS COSTIFERA, sp. nov.

Shell small, fusiform, white with a broad chestnut band on the centre of the body-whorl. Whorls 5½ rounded. the first two being quite smooth, the rest sculptured with strong, rounded axial ribs, fourteen on the penultimate. sixteen on the body whorl, they fade away a little below the periphery. The base being encircled by numerous fairly strong spiral liræ; the ribs are crossed by very fine, sharp spiral threads. Aperture fairly large, pointed above, broad at the base, where it scarcely becomes a canal; columella excavate, bearing two low tubercles, outer lip rounded and simple.

Length, 4.5; breadth, 2 mill.

Habitat. Type, with five others from about 40 fathoms East of Thouin Bay.

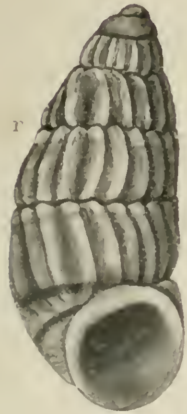
This species closely resembles *Mitromorpha axicostata* Verco. It is, however, a narrower shell, with more rounded whorls, and the spiral liræ are much less strong; it has, too, a more bluntly rounded apex.

Pl. XIV., fig. 2.

NEPOTILLA DIAPHANA, sp. nov.

Shell small, thin, of a semi-transparent texture, colour yellowish-brown, pinkish towards the apex, broadly fusiform, whorls five, including a prominent two-whorled protoconch, which is strongly spirally lirate; the adult whorls much rounded, and strongly cancellate. There is a hollowed space below the suture, corresponding with a shallow sinus, and ornamented by curved growth lines; strong axial ribs cross the whorls and are separated by spaces of about their own width; they number about twenty on the body whorl and fade away below the periphery; they are crossed on the spire by three spirals, less strong than the ribs and about equally spaced, so that square meshes are formed, producing small nodules at the junction. These spirals continue on the base, where they are smaller and closer together. Aperture broad, with a very short open canal, columella excavate, with a narrow callous lip, outer lip rounded, corrugated by the sculpture, with a broad rather shallow sinus at the suture.

Length 4.4; breadth, 2 mill.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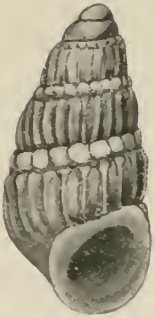
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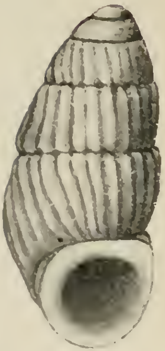
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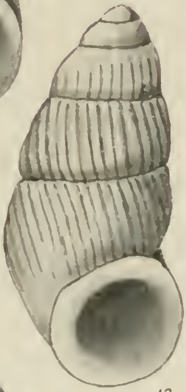
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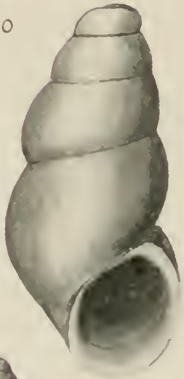
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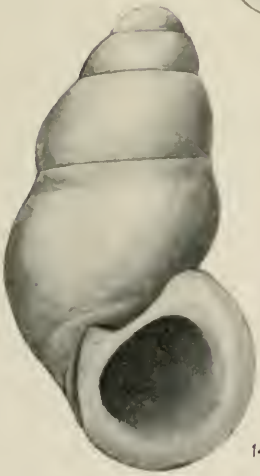
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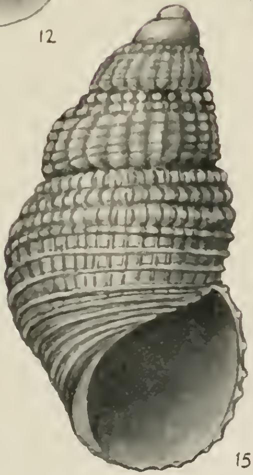
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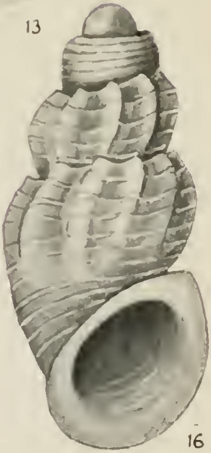
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Habitat. The type, with five others from Frederick Henry Bay, two others from Thouin Bay, East Coast. All the specimens have been taken from the roots of the giant kelp and have much the appearance of young shells.

It resembles N. *legrandi*, Beddome, more than any other, but is entirely distinct from that species, which is much more strongly sculptured, and has many more spirals.

Pl. XIV., fig. 3.

POLINICES CATENOIDES, sp. nov.

Shell of moderate size, rotund, with a small but sharp spire; umbilicate. Whorls five, rapidly increasing, the last very large, rounded, with a slight depression below the suture. Aperture roundly lunate, rather produced in front, lip thin. Columella a little concave, with a callus partly covering the umbilicus, and developing into a pad where it joins the lip above; the callus has a distinct groove crossing it, at the upper edge of the umbilicus, which latter is of moderate size, deep and perspective. The colour appears to be yellowish-brown, paler below the suture, and on the base, and there are indications of chestnut flames crossing the sutural band, and patches of the same colour on the body whorl. Diameter and height, each 15 mm.

Type with 10 others, mostly small, from about 60 fathoms South of Port Arthur and one from 100 fathoms East of Cape Pillar.

This species is remarkably like *P. catena*, da Costa, from Northern Europe, so much so, that it is at first difficult to see any differences. However, the umbilicus is rather smaller, and the front of the columella more produced; it is rather broader, has a depression below the suture, a furrow on the columella, and probably the colour is different. Compared with *P. aulacoglossa*, Pils. and Van., it is a much rounder shell, and lacks the heavy pad over the umbilicus, besides being much smaller. I have known this species for a considerable time, but hesitated to describe it, hoping for better examples; such, however, have not yet come to hand. All my specimens are "dead," and most have lost their colour, but some show traces of coloration as above described. It is possible it reaches a considerably larger size, as none of mine appear to be quite adult. Its station would appear to be from about 50 to 100 fathoms.

Pl. XIV., fig. 4.

MARGINELLA OBESULA, sp. nov.

Shell very small, broadly ovate, translucent white, with a distinct, but blunt spire of two whorls. Aperture narrow above, but widening rapidly towards the rounded front. Columella convex; the first plait, which is a continuation of the front of the shell, is large, strong, and curved. The next above is much smaller and rather close to the first, above are four minute plaits, which reach quite two-thirds up the columella. Outer lip thickened, incurved in the middle, where it is armed with about nine minute teeth.

Length, 2; breadth, 1.4 mill.

Types, with six others, from Frederick Henry Bay, one other from Port Arthur. Whilst this resembles such relatives as *M. shorehami*, Prit. and Gat., it nevertheless has some good points of difference, and these are emphasised by the very peculiar animal, which, showing through the translucent shell, exhibits a bright orange colour, curiously netted with white lines, each bordered with black, empty shells show no traces of this peculiar ornamentation, which must belong to the animal. In our other small species the animal usually appears black or horny.

The habitat is also peculiar. Most of the specimens have been taken from roots of the giant kelp, showing it to inhabit rocky bottoms.

Pl. XIV., fig. 5.

MARGINELLA RINGENS, sp. nov.

Shell very small, broadly pyriform, pure white, semitransparent, with an exsert, but very small spire of two whorls, which has a tilt towards the right. Aperture broad, especially towards the rounded front. Outer lip solid, shouldered, and much curved above, but straight on its inner side, where it bears about six small denticles rather irregular in size and spacing. Columella convex, but rather straight in its middle part, and carries about six plaits, of which the first is a long, upward sweep from the base; the next two are well developed, those above being much smaller.

Length, 1.8; breadth, 1.2.

Type from Kelso, Tamar Heads, collected by the late Aug. Simson; another exactly similar from the Petterd collection, probably from the same locality; and eight others from 40 fathoms off Thouin Bay, which differ slightly in having more minute denticles on the lip, but are otherwise the same.

This is very close to *M. angasi*, Crosse, of which it may be a variant. It is more broadly shouldered, with a larger aperture, and has the toothed outer lip.

Pl. XIV., fig. 6.

MARGINELLA MULTIDENTATA, sp. nov.

Shell small, white, broadly-ovate, spire hidden, aperture rather wide. Columella convex, bearing about nine main plications, of which the anterior three are the strongest; there are several small subsidiary teeth between the upper ones. Outer lip rises above the summit; is strongly thickened and armed inside with about ten minute denticles.

Length, 1.5; breadth, 1.2 mill.

Type, with three others from about ten fathoms, between Gordon and South Bruny, D'Entrecasteaux Channel.

This species is nearest related to *M. thouinensis*, May; it differs in being shorter and broader, having a wider aperture, stronger dentition, and the crenated outer lip. The small intercalated teeth have not been noticed in any other Tasmanian Marginella.

Pl. XIV., fig. 7.

MARGINELLA INCERTA, sp. nov.

Shell minute, smooth, white, opaque, ovate; spire small but distinct, of two whorls. Aperture narrow above, almost linear for half its length, then widening to the rounded front. Outer lip moderately thickened, slightly curved, smooth within. Columella convexly rounded, with two distinct plaits, rather near together, of which the anterior is the stronger.

Length, 2; breadth, 1.6 mm.

Type, with five others, from about 40 fathoms off Thouin Bay. This species closely resembles *M. freycineti*, May, in size and shape; it has more spire, is broader, with a more curved columella, and only two plaits.

Pl. XIV., fig. 8.

Iredale in Trans. N.Z. Inst. for 1914, p. 457, proposed a new genus *Estea* for a Rissoid group, and mentions *Rissoa columnaria*, Hedley and May, as a good representative. We have a large number of species, which seem to fall naturally into Iredale's genus. There are some seventeen Tasmanian named species, and others not yet described, that I can so place, only two or three of which are somewhat abberante. Amongst them is a little subgroup of four species, closely allied to each other, upon which I now offer some observations, describing one as new.

ESTEA TUMIDA, Tenison Woods.

Described in these proceedings for 1875, p. 147, as *Diala tumida*, a figure was given by Tate and May for this species, Pl. xxvi., fig. 67, which, however, is not correct, but represents a nearly related species, which I am dealing with later.

A careful examination of the types (two specimens) preserved in the Hobart Museum, and which are very bleached, show it to be a good species, and of which I have taken a fair number of specimens, always from the roots of the giant kelp; fresh shells are of a pinkish tinge, and have a narrow chestnut band below the suture, and two on the body whorl, one at the periphery, and the other on the base. These bands are characteristic.

The ribs are also broad, strong, and oblique. I present a figure from a specimen compared with the type.

Pl. XV., fig. 9.

ESTEA OLIVACEA, Dunker (*Rissoa*).

Rissoa diemenensis, Petterd, is an absolute synonym, as Tate and May correctly determined, the type being preserved in the Hobart Museum. This species differs from *E. tumida* in its more squat shape, and more numerous ribs, which are narrower and straight; they also form a nodular bead below the suture. It is common at Tamar Heads, but seems absent from the South, where its place is taken by the next species.

Pl. XV., fig. 10.

ESTEA KERSHAWI, Tenison Woods (*Rissoina*).

Rissoina kershawi, Tenison Woods, P.R.S. Vict., 1877, p. 57. This was united with *E. tumida*, by Tate and May, but examination of the types in Melbourne Museum shows it to be a distinct, but closely related species. It has three adult whorls, instead of four, the ribs are straighter, and much more numerous, and the mouth is not so round, and it lacks the colour bands; the usual colour is yellowish-brown, with a pale band below the suture. It is found in the Derwent Estuary and D'Entrecasteaux Channel, and is common at Tamar Heads, with *E. olivacea*, which it closely resembles, but may be distinguished by its more cylindrical form, more numerous ribs, and the absence of the sutural bead.

Pl. XV., fig. 11.

ESTEA MICROCOSTA, sp. nov.

Shell small, rather pupoid, solid, pinkish, the apical whorls are the darkest, the last half of the body whorl nearly white. Whorls five, rounded. The first two form a smooth proto-conch; the three adult whorls are regularly axially ribbed, with very fine sharp ribs, which are somewhat oblique, and become evanescent on the base. Aperture almost round, lip expanded all round.

Length, 2.5; breadth, 1.2 mill.

Type, with a number of others, from 100 fathoms seven miles East of Cape Pillar. This is closely related to *E. kershawi*. It differs principally in the much more numerous and finer ribs, and rounder mouth, and its rather more cylindrical form. *E. tasmanica*, Tenison Woods (*Eulima*), is much larger, more pyramidal, with excavate sutures.

Pl. XV., fig. 12.

ESTEA PERPOLITA, sp. nov.

Shell small, white, highly polished, elongate, blunt, the apex being much flattened. Whorls four and a half, rounded, especially the penultimate; suture well impressed; mouth roundly ovate, lip a good deal expanded.

Length, 1.8; breadth, 1 mill.

Type, with 12 others, from 50 fathoms off Thouin Bay, and three from 100 fathoms off Cape Pillar.

A species principally distinguished by its rounded whorls, flattened summit, and high polish, and differs from its near relative *E. rubicunda*, Tate and May, in being shorter and blunter.

Pl. XV., fig. 13.

ESTEA LABROTOMA, sp. nov.

Shell minute, conical, solid, yellowish-brown, smooth, shining. Whorls four, rounded, suture well impressed, the body whorl being rather restricted below the suture. Aperture roundly ovate, oblique, surrounded by a very broad expanded lip, which has a curious deep indentation where it joins the body whorl. This remarkable feature is diagnostic.

Length, 1.4; breadth, .7 mill.

Type, with 14 others from Frederick Henry Bay, taken from roots of the giant kelp.

Pl. XV., fig. 14.

MERELINA SCULPTILIS, sp. nov.

Shell solid, broadly ovate, cream coloured, imperforate; whorls five, rounded, the first two forming a smooth proto-conch. Suture well defined by a deep channel. The adult whorls are crossed by radials, which are strong, and predominate on the two upper whorls, but grew finer and much more numerous on the body whorl. These are crossed by spirals, which from being at first inferior, become on the body much the stronger. The body whorl carries about thirteen spirals, of which the upper three are large, rounded, and noduled by the axials. The lower spirals are narrow, and scarcely affected by the ribs, which fade at the periphery. Seven spirals cross the ribs on the middle whorl, of which the one above the lower suture, and the two below the upper suture are the stronger, the latter forming rows of nodules; the third whorl is similar. Aperture ovately-pyriform, the columella, which is not continuous, is rather expanded anteriorly; outer lip thin, dentated by the sculpture.

Length, 3; breadth, 1.5 mill.

Type, with three others, from 50 fathoms off Thouin Bay.

From its nearest relative *R. filocincta*, Hedley, it may be distinguished by its flatter whorls, much more numerous axials, the strong beaded spirals on the shoulder, the channelled sutures, the discontinuous peristome, and the sharp outer lip.

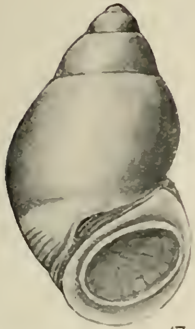
Pl. XV., fig. 15.

HAURAKIA SUPRACOSTATA, sp. nov.

Shell small, rather elongate, yellowish white, semitransparent; whorls four, rounded, suture deeply impressed. The apical whorl is small, dome shaped, and smooth; the next is tabular and finely spirally grooved; the last two axially ribbed with strong oblique ribs, which bend towards the left at the suture. There are about six on a half-turn of the whorls; they fade away below the periphery, and are crossed by fine distant liræ, which are scarcely raised, and show as white opaque lines on the translucent shell. Aperture roundly pyriform, lip expanded and continuous, projecting beyond the whorl posteriorly.

Length, 1.7; breadth, .8 mill.

Type, Frederick Henry Bay, taken from a root of the giant kelp. Three others from 40 fathoms off Thouin Bay;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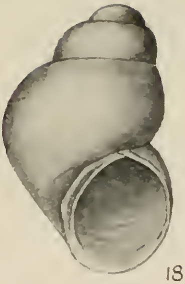
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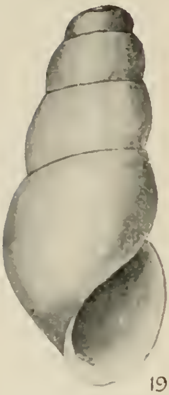
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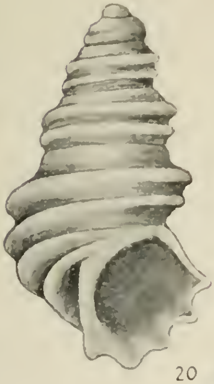
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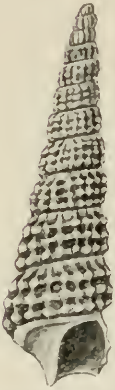
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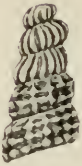
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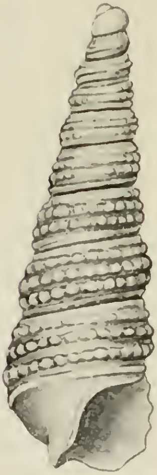
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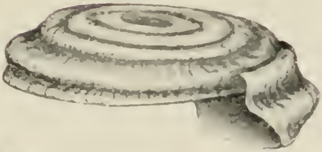
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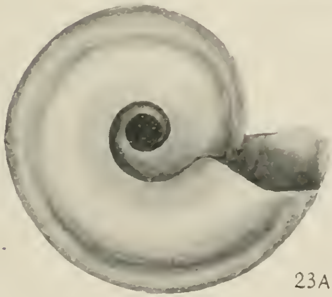
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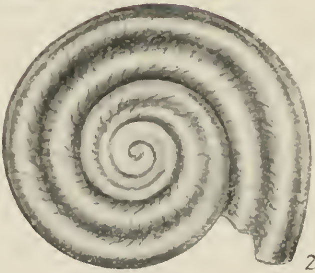

23B

a very distinct little species. I place this in *Haurakia* with some diffidence, but it seems to come closer to such species as *H. strangei* than any other forms.

Pl. XV., fig. 16.

AMPHITHALAMUS LUTEOFUSCUS, sp. nov.

Shell minute, turbinate, smooth, lustrous red-brown, with the first half of the body whorl and mouth, yellow, also a light band below the suture. Whorls four, much rounded, body whorl large in proportion. Aperture: The actual opening is small, oval, and set very obliquely to the spire; it is surrounded by a raised edge or keel. The peristome, which is continuous, is broadly pyriform, expanded and planulate, recessed towards the aperture; it is projected somewhat from the base of the shell, which is sub-umbilicate. The operculum is thin, semi-transparent, and appears to be subspiral.

Length, 1; breadth, .6 mill.

Habitat. Type, with several others, from Kelso, near Tamar Heads, collected by Augustus Simson.

This minute shell is in size and general appearance similar to *A. jacksoni*, Brazier, but differs sufficiently in the details of the mouth, and also in the coloration; it is in some respects still more like *A. atropurpurea*. That, however, is a much more ventricose and massive shell, which does not seem to have been heretofore recognised as a member of this genus, although it is extremely characteristic, and closely allied to *A. jacksoni*.

Pl. XVI., fig. 17.

NOTOSETIA PURPUREOSTOMA, sp. nov.

Shell minute, bluntly turbinate, smooth, polished, pale rose colour, lip rose-purple. Whorls three, much rounded, suture impressed. Aperture, roundly oval, lip continuous, with a thickened edge, and reflexed on the columella side.

Length, 1; breadth, .8 mill.

Type, with a dozen others, from Penguin, in shell sand. It has a superficial resemblance to *Amphithalamus atropurpurea*, Frauenfeld, from which the latter's typical aperture at once separates it.

Pl. XVI., fig. 18.

RISSOPSIS BREVIS, sp. nov.

Shell very small, cylindrical, blunt, smooth, pure white, pellucid. Whorls, four and a half, rather rounded, suture impressed, apical whorls much flattened. Aperture pyriform; outer lip thin and sharp, somewhat expanded anteriorly.

Length, 2; breadth, .8 mill.

Type, with two others, from 40 fathoms off Thoum Bay, one other from off Arch Island, D'Entrecasteaux Channel.

I place this with *Rissopsis*, as it seems congeneric with the species assigned to that genus by Professor Tate, a location which I think requires confirmation.

Pl. XVI., fig. 19.

LIPPISTES CONSOBRINA, sp. nov.

Shell small, whitish, smooth, pyramidal, umbilicate. Whorls four or five, including a smooth proto-conch of about two turns. The adult whorls are encircled by two strong keels, the upper of which is the larger, and is a little above the centre of the whorl. These keels are separated by a furrow of about their own width. There are two additional keels on the base, the anterior of which encircles the umbilicus, which is deep, but rather narrow, and separated from the aperture by a strong columella pillar. Aperture rounded, outer lip strongly dentated by the keels.

Length, 3; breadth, 1.5 mill.

Type, with three others, from 40 fathoms three miles East of Schouten Island.

In these proceedings for 1910, p. 309, I recorded this species as *L. gracilenta*, Brazier. I have since had an opportunity of examining Brazier's type, which shows that the two forms are specifically distinct, *gracilenta* being much larger and more attenuate in the spire. Our shell comes between this and *L. zodiacus*, Hedley, which is similarly sculptured, but is only half the length, and has a different apex.

Pl. XVI., fig. 20.

CERITHIOPSIS APICICOSTA, sp. nov.

Shell small, elongate, or narrowly pyramidal, whitish. Whorls eleven, including a three-whorled proto-conch, which is strongly axially ribbed. Adult whorls moderately rounded, suture well impressed; sculpture, three nodulous keels of about equal size and distance encircle the whorls. They are separated by a deep groove, across which the nodules are connected by low axial ridges. There is a smooth keel on the base, which is otherwise plain. Aperture subquadrate? (rather broken), with a short anterior canal. Outer lip dentated by the sculpture.

Length, 7; breadth, 1.6 mill.

Type, from 100 fathoms seven miles East of Cape Pillar. Several others, mostly juvenile, from about 40 fathoms off Thouin Bay. This species is rather nearly related to *C. trisculpta*, May, which was described from a half-grown shell. It is narrower, with weaker sculpture and a different, though somewhat related proto-conch, which seems to separate it from all other species.

Pl. XVI.. figs. 21, 21a.

CERITHIOPSIS MAMILLA, sp. nov.

Shell small, pale brown, pyramidal. Whorls nine and a half, rounded, including a smooth, bulbous proto-conch of about two whorls. Adult sculpture consists of three main keels, which are more or less nodulous, the central one being rather the largest. They are separated by equal sized, smooth spaces. There is a small smooth keel below the others, which shows very distinctly on the base, which is smooth. Aperture subquadrate, inner lip very concave, outer lip dentated by the keels. There is a short anterior canal. The keels on the upper whorls are almost or quite smooth. As growth proceeds they become faintly, irregularly nodulous. On the three last whorls the nodules are more distinct.

Length, 5; breadth, 1.4 mill.

Type, with ten others, from about 40 fathoms off Thouin Bay, East Coast.

Whilst the shape of the shell is fairly constant, and the pullus always the same, co-types show considerable variation in the sculpture; whilst most are similar to the type, they may be almost destitute of nodules, or there may be three strongly nodulous keels on all the adult whorls.

Pl. XVI., fig. 22.

ORBITESTELLA IREDALEI, sp. nov.

Shell minute, discoidal, smooth, white, spire flat. Whorls about three and a half, square in section, bicarinate, the upper carina at the angle being the largest, and forming a spiral keel on the flat summit to the apex. The flattened part of the whorl between the angle and the suture is roundly elevated; base margined by the lower keel, otherwise smooth except for lines of growth, which are in evidence over the whole shell, broadly, perspectively umbilicate to the apex. Aperture roughly quadrangular, wider than the height of the shell; at the outer edge bidentated by the keels.

Diameter, 1; height, about .4 mill.

Type, with a few others, from Frederick Henry Bay, taken from the roots of the giant kelp.

This minute shell has a considerable resemblance to *Cyclostrema bastowi*, Gatliff, the type of *Orbitestella*, and I consider it congeneric; probably *C. mayii*, Tate, should also be included in this genus.

Note.—The specimen from which the drawings were made was accidentally destroyed.

Pl. XVI., figs. 23, 23a, 23b.

PATELLOIDA CORRODENDA, sp. nov.

Shell roundly oval, rather depressed, apex one-third from the anterior end, exterior furnished (in the type), with 20 radiating, smooth ribs, irregularly spaced, which extend from the summit to the margin, and several shorter ones, intercalated near the margin. The ribs are but slightly raised, dull white, the wider interspaces being black, apex eroded. Interior margin black, bearing white triangular spots opposite the ribs, with their sharper points towards the edge. Behind these is a narrow purplish ring, then bluish, with a brownish-white centre.

Length, 14; breadth, 11; height, 5 mill.

Type, from the western shore of Frederick Henry Bay.

While fairly constant in shape, it varies much in the number of ribs, sometimes being nearly twice as numerous as given above. The shell is often so much corroded that the sculpture only remains on the marginal third. The species is common at a spot near my home living on large diabase boulders, at about half-tide. I have not yet noticed it elsewhere; it long escaped notice, as it is associated with *Siphonaria diemenensis* of about the same size and general appearance. As they are exposed to the air for several hours at every tide, they suffer extremely from erosion, even quite small ones being badly affected. It resembles *P. flammea*, Quoy and Gaim, in general shape. That species is destitute of ribs, but has fine axial striæ, and a different interior coloration, and lives near low water mark.

Pl. XVII., figs. 24, 24a.

COCCULINELLA TASMANICA, sp. nov.

Shell small, white, thin, smooth, narrowly oval, pyramidal, apex subcentral, margin much raised at each end. There is no sculpture, except faint growth lines.

Length, 5; breadth, 2.6; height, 2 mill.

Type, with a number of others, from forty to seventy fathoms along the East Coast.

This species is a near ally of *C. compressa*, Suter, from New Zealand, and *C. coercita*, Hedley, from New South Wales. It is nearer the former, which is rather narrower, higher, and has fine radial sculpture. The latter is narrower, flatter, and has an almost flat base. Probably they are local forms of one variable species, in which perhaps some peculiarity in their place of attachment has determined the form of the base; straight in one case, much curved in the others.

All the specimens taken have been "dead" shells, but there are indications that in life they would be glassy and semi-transparent.

Pl. XVII., fig. 25.

EULIMA APHELES, Tenison Woods.

Described in these proceedings for 1878, p. 40.

The type was missing for many years, but was lately discovered, having been mislaid in the Tasmanian Museum. I here present a figure from the type, which is so marked by the author. I consider it to be an absolute synonym of *Eulima augur*, Angas.

Pl. XVII., fig. 26.

EULIMA MARGINATA, Tenison Woods.

Described with the last and also recovered with it, and marked as type by the author. This specimen I have also figured. It is given by Tate and May, P.L. Soc., New South Wales, for 1901, p. 381, as a prior name for *Stylifer lodderæ*, Petterd. This identification was incorrect. It is a true *Eulima*, and I believe it to be only a short, stumpy form of the variable *E. augur*, Angas.

Pl. XVII., fig. 27.

COMINELLA LINEOLATA, Lamarck.

This is a very common mollusc on most parts of our coast, and varies much in size, form, and colour. On the western side of Frederick Henry Bay, in a rather exposed situation, a short, thick-set banded form is plentiful. On December 15th of last year, I noticed they were spawning under fairly large stones. The egg capsules formed dense masses, closely clustered together. The method adopted is for single capsules to be firmly attached at some distance apart; then three or four others are fastened to the upper edges of these, giving the combination somewhat the appearance of the growth of the prickly pear. The colour is ivory-white, the stalks whiter. I present drawings, which will give a better idea of the form than much description. The height of the single specimen is about 9 mm., that of the cluster about 15 mm.

Pl. XVII., figs. 28, 28a.

I can also add to our list the following seven species and one variety already described by various authors.

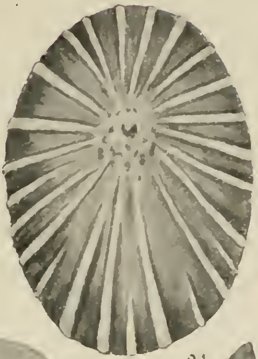
1. *Arca metella*, Hedley, P.L. Soc. N.S. Wales, 1917, p. 681, Pl. li., f. 36-37. About a dozen single valves taken in 100 fathoms off Cape Pillar, and a few from other places on our East and South Coasts, from 10 fathoms downwards.

2. *Pseudarcopagia botanica*, Hedley, Roy. S. N.S. Wales, 1918, Supp. p. 27. This species seems confined to our Eastern and Southern Coasts, where it takes the place of *P. victoriæ*, Gatliff and Gabriel, which is found in Bass Straits, and perhaps does not occur South East of the Furneaux Group, where I found it in profusion.

3. *Zalapais lissa*, Suter, *Cyclostrema*, P. Mall. Soc., viii., p. 25, pl. ii., f. 10-11. A number of examples taken in Frederick Henry Bay from kelp roots.

4. *Triphora mamillata*, Verco; *T. albovittata*, Hedley, var. *mamillata*, Verco, T.R. Soc. S.A., 1909, p. 285. I recorded this in these proceedings for 1910, p. 309, as *albovittata*, but our shells are Verco's variety, which I consider is quite sufficiently distinct to be given specific rank. It has also been taken in 40 fathoms off Thouin Bay.

5. *Turritella atkinsoni*, Tate and May, var. *medioangulata*, Verco, *op. cit.*, 1910, p. 125, pl. xxx., fs. 8-9. Several from 50 fathoms North of Maria Island.



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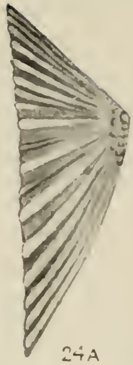

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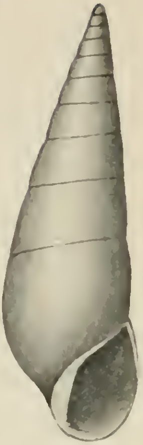

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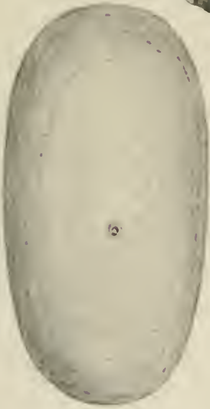

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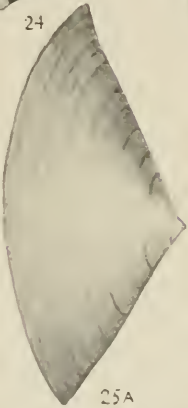

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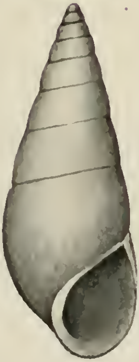

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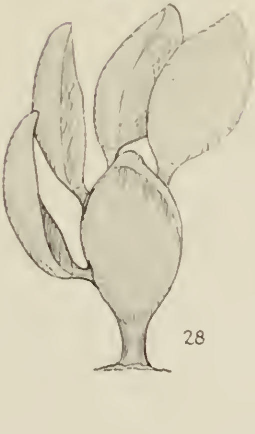

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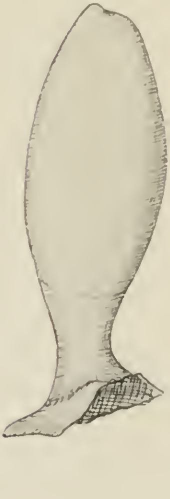

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6. *Estea janjucensis*, Gatliff and Gabriel, *Rissoa*, P.R. Soc. Vic., 1913, p. 67, pl. viii., f. 2. Three specimens from Penguin, North Coast, identified by Mr. Gabriel.

7. *Diala translucida*, Hedley, P.L.S. N.S. Wales, xxx., 1906, p. 522, pl. xxxiii., f. 35. Tate and May, *op. cit.*, 1901, p. 388, record this in error as *D. picta*, A. Adams. A few examples have been taken in D'Entrecasteaux Channel, in about 10 fathoms.

8. *Segmentina victoria*, Smith, P.L.S., 1881, p. 296, pl. vii., f. 2. A number of specimens in my possession were collected many years ago by Mr. E. P. Harrisson in Lake Tiberias, and are exactly the same as Victorian shells. This makes an interesting addition to our fresh water fauna.

◆

A RE-EXAMINATION OF PROFESSOR HASWELL'S TYPES OF AUSTRALIAN *PYCNOGONIDA*.

By Professor T. Thomson Flynn, B.Sc.,

Ralston Professor of Biology, University of Tasmania.

Plates XVIII.-XXII., figs. 1-26.

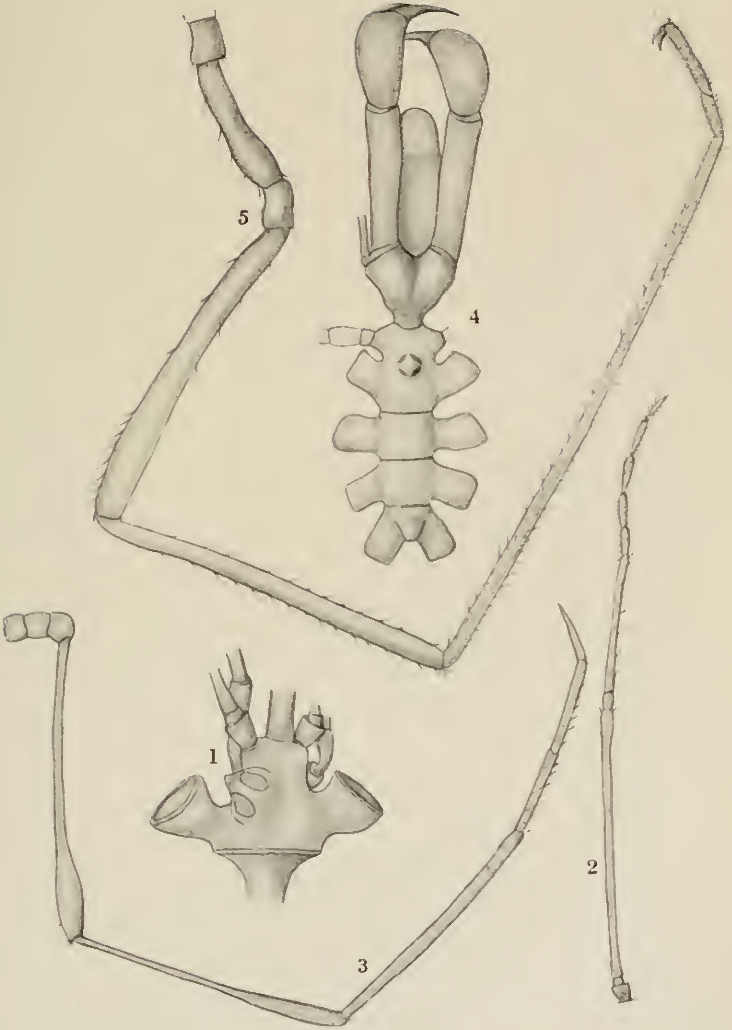
(Received 8th July, 1919. Read 11th August, 1919.)

Diagnostic methods in the case of the interesting group of Pycnogonida have so far altered in the last thirty years, that it needs no apology on my part for attempting a revision of the descriptions of Australian Pycnogonida published by Professor Haswell in the early eighties. This revision has been made possible by the courtesy of the trustees and curator of the Australian Museum, who placed the holotypes at my disposal, and to whom I tender my best thanks. I have also to thank Professor S. J. Johnston of Sydney for the loan of other specimens collected for the use of his department.

In the following description the specimens from the Australian Museum are indicated by the collection number.

It is necessary to state that the holotypes have been preserved as microscope slides, and while this is a convenient method of preservation it has its disadvantages in the case of subsequent examinations. It is sometimes impossible, for example, to make out with any degree of certainty the arrangement and structure of the spines of the ovigers or even of its joints when, as is often the case, it is tucked under the body of the Pycnogonid on a microscope slide. Further, while every care has been taken with the measurements it must be remembered that the flattening of the specimen necessary in preparing a miscroscopic slide, alters very definitely the relation of breadth to length.

Many of the works cited in the following pages are not procurable in Tasmania, and in these cases I have to depend on notes made when on a visit to Sydney.



T T F del.

Rhopalorhynchus tenuissimus. figs. 1-3
Nymphon æquidigitatum, figs 4-5

RHOPALORHYNCHUS TENUISSIMUS, Haswell.

(Pl. XVIII., figs. 1-3.)

1884, *Colossendeis tenuissima*, Haswell, 1884, p. 1029, pl. 56, figs. 5-8.

1893, *Rhopalorhynchus clavipes*, Carpenter, 1893, p. 24, pl. II., figs. 1-10.

1908, *Rhopalorhynchus tenuissimus*, Loman, 1908, p. 24.

1909, *Rhopalorhynchus tenuissimus*, Thompson, 1909, p. 533.

Specimen.—Australian Museum Collection, G5195, holotype, male, Port Denison, Queensland.

Description.—It is only necessary to supplement in a small degree Prof. Haswell's account of this species.

Cephalon is short and narrow, not expanded in front. Segmentation is distinct.

Ocular tubercle is situated on the posterior portion of the cephalon. It is cylindrical with a small rounded cone at the apex.

Abdomen is present, but as usual in this genus is quite minute.

Palps are ten jointed. The first joint is short and thick and expanded at the extremity; the second is very small; the third joint is very long and slender; the remaining joints are as described by Haswell.

Ovigers.—The character of the spines of the last few joints cannot be determined with accuracy as the joints had not been cleaned before the specimen had been mounted originally. The spines, however, seem to be long and sharp and arranged in several rows.

Measurements:—

	mm.
Proboscis, length	4.41
maximum diameter	1.05
Trunk, length	5.28
width behind first crurigers	.29
,, ,, second ,,	.32
width across ,, ,,	1.58
Palp, first joint	.12
second ,,	.07
third ,,	2.92
fourth ,,	.19
fifth ,,	1.53
sixth ,,	.31
seventh ,,	.38
eighth ,,	.42
ninth ,,	.40
tenth ,,	.38

		mm.
Leg,	second coxa	.48
	third ,,	.33
	femur	5.76
	first tibia	5.47
	second ,,	4.94

Remarks.—The holotype was taken in Port Denison, Queensland (depth not given).

There is no doubt in my mind that *R. clavipes* (Carpenter) must be regarded as a synonym of *R. tenuissimus* (Hasw). The lengths and proportions of the joints of the trunk, palps, and legs agree perfectly in the two species. The proportion of the length of the proboscis to the trunk is 1 : 1.2 in *R. tenuissimus*. In *R. clavipes* it is 1 : 1.1. The somewhat different shape of the proboscis in *R. tenuissimus* is no doubt due to the distortion caused by the specimen being mounted as a microscope slide.

It is possible that the cheliform arrangement of the terminal portion of the oviger may be confined to the male.

Further, both species come from the Australian region of the Tropics.

NYMPHON ÆQUIDIGITATUM, Haswell.

(Pl. XVIII., figs. 4-5; pl. XIX., fig. 6.)

1884, *Nymphon æquidigitatum*, Haswell, 1884, p. 1022, plate 56, figs. 1-5.

1889, *Nymphon æquidigitatum*, Whitelegge, 1889, p. 233.

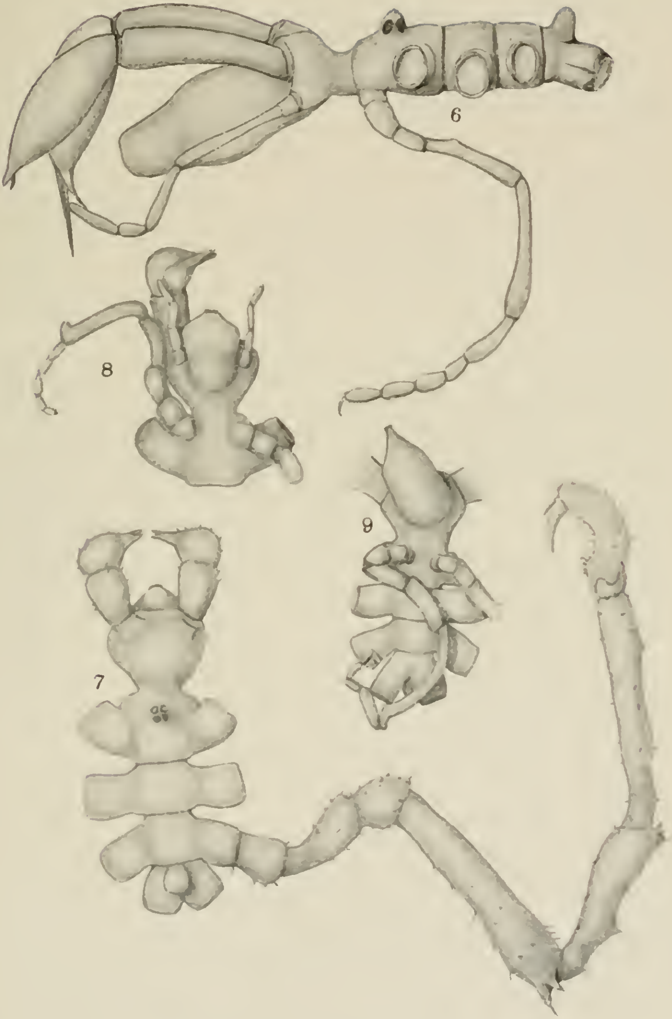
1908, *Nymphon æquidigitatum*, Loman, 1908, p. 38.

Specimens:—Australian Museum Collection, No. G5196, holotype, ♂, Pt. Jackson; Australian Museum Collection, No. G5198, paratype, ♂; Australian Museum Collection, No. G5197, paratype, ♀, Broughton Island.

In addition, several spirit specimens from Port Jackson and from Shark Island, Port Jackson, contained in the Australian Museum collection and that of the Zoological laboratory of the University of Sydney.

In view of the fact that this genus is an extraordinarily large one, comprising very many species distinguished from one another by relatively insignificant characters, I have thought it desirable to re-describe Haswell's species in some detail.

Description:—*Body.*—Fairly broad and stout, suture lines distinct, *crurigers* well separated, each a little longer than broad—*cephalic segment* large, its length being



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Nymphon æquidigitatum, fig. 6
Pallene (?) valida, figs. 7-8
Pseudopallene pachycheira, fig. 9

greater than that of the other segments together. *Cephalon* is much expanded in front, neck fairly narrow but not particularly long.

Proboscis large and stout, expanded in mid-region and tapering towards each end, the whole organ somewhat pear-shaped with smaller end forward.

Chelifori well developed, scape uni-articulate, expanded distally, about same length as proboscis, hand powerfully developed with fingers shorter than the palm, fingers crossing at the apex and possessing a large number of fine teeth.

Palps five-jointed, first joint very small, second joint longest equalling the third and fourth taken together, fourth less than half the third, fifth joint long but a little shorter than the second, fourth and fifth joints finely setiferous, occasional spines on other joints specially towards end of third.

Ovigers.—Ten-jointed with terminal claw, situated on slight ventral outgrowth in front of first pair of legs. The proximal joints increase in length from the first, which is small, to the fifth, which is the largest joint of the limb; fourth joint is rather swollen and expanded distally; the fifth joint is long and narrow bearing distally a fringe of long delicate hairs, as does also the sixth. This joint is about one third the length of the fifth. The seventh, eighth, ninth and tenth joints are about equal in length, all gently curved and bearing pinnate spines. These spines vary in shape. In the ovigerous male they are arranged in a single row on each joint. The middle spines of each row are long and stiletto-like, finely toothed on each edge, while at either end of row they may become worn to a rounded apex. On the terminal joint, the spines become particularly worn. The terminal spine is long, simple and hook-shaped.

Ocular tubercle low and rounded, visual elements large and of equal size.

Abdomen cylindrical, slightly tapering posteriorly, and projecting upwards.

Legs.—The proportions of the joints vary somewhat from those given in the original descriptions. The length of the first and second coxæ are as stated by Haswell; the third coxa is a short joint less than half the length of the second; femur over six times the length of the third coxa and a little shorter than the first tibia, femur swollen (especially so in the female) and slightly curved; first tibia is as usual long and narrow; second tibia extremely long, being equal in length to the femur and first tibia together;

tarsus is short; propodus somewhat longer; terminal claw stout and curved; auxiliary claws slenderer but about equal in length to the main claw. Minute spines occur scattered over the legs. These are sparse on all joints up to the second tibia but are plentiful on the tarsus and propodus. Distal fringes occur on all joints but the last three. A well-marked lateral line is present on each leg.

Sexual apertures.—These are easily seen in the female in which they are large and oval and present on all four legs. In spite of the examination of a number of specimens I have not been able to see them in the male.

Measurements:—

	Holotype ♂	Paratype ♂	Paratype ♀
	mm.	mm.	
Proboscis—			
length	1.7	1.82	
greatest diameter ..	1.1	1.16	
Trunk, length...	2.4	2.86	
Cephalon—			
length	1.5	1.58	
greatest width... ...	1.04	1.10	
Neck, width ...	.24	.3	
Trunk—			
width between 1st and 2nd pair of crurigers ...	.70	.76	
width across 2nd pair of crurigers ...	1.50	1.60	
Abdomen—			
length	.32	.40	
Third leg—			
first coxa ...	.48	.52	
second coxa...	1.56	1.66	
third coxa ...	.60	.68	
femur	3.90	4.08	
first tibia ...	4.12	4.50	
second tibia...	6.86	8.64	
tarsus	.52	.54	
propodus... ...	.94	.96	
claw	.20	.20	
auxiliary claw	.20	.20	

Palp—	R.	L.	R.	L.	R.	L.
second joint..	.84	.92	1.06	1.04	1.30	
third ,, ...	.54	.60	.70	.74	.90	.90
fourth ,, ...	.24	.28	.30	.30	.35	.35
fifth ,, ...	.70	.70	.76	.62	.94	.90

Remarks.—Judging by its relative abundance in the collection of the Australian Museum, and of the Zoological Department of the University of Sydney, this must be the most common pycnogonid found in Port Jackson.

Affinities —I find on consulting my notes that Loman (1908, p. 38) suggests that this species is closely allied to *N. giraffa* from the Strait of Macassar and possibly also to the insufficiently described *N. longiceps* (Grube, 1869) from the China Sea.

Pallene (?) valida, Haswell.

(Plate XIX., figs. 7-8.)

1884, *Nymphon validum*, Haswell, 1884, p. 1024, pl. 54, figs. 6-9.

1908, *Parapallene valida*, Loman, 1908, p. 48.

Specimens.—Australian Museum Collection, G5199, marked "type, Port Stephens"; Australian Museum Collection, G5200, marked "Type ♀, Port Stephens." These are two microscope slides. The former of the specimens is a male, the latter, in spite of its being marked female, is also a male.

Description.—*Body* is fairly robust with all segments distinctly separated. The *crurigers* are separated from one another by less than their own diameter.

Cephalon is expanded with a prominent anterior margin projecting over the proboscis. Above the base of each chelophore on the cephalon is a prominent tubercle with two spines. The neck is well developed and short but fairly wide.

Ocular tubercle is situated just behind the neck, immediately anterior to the level of the first pair of crurigers. There are four well developed eyes. The shape of the ocular tubercle is not determinable with accuracy, but it appears to be low and rounded.

Abdomen is short and rounded.

Proboscis is short and cylindrical directed obliquely downwards. It is somewhat constricted in the middle, obtusely conical in front with a wreath of very delicate bristles round the mouth. The proboscis is inserted into the ventral side of the cephalon some distance behind its anterior margin.

Chelophores have a simple scape with ovoid palm and short stumpy fingers. The hand is turned inwards in front of the mouth. The fingers are provided with many small teeth. The scape and palm possess a number of short hairs.

Palps are four-jointed. They are much shorter than the chelophores, but extend well beyond the proboscis. The basal joint is short and thick, the next joint longer, the third joint longest. The fourth joint is shorter than the third but longer than the second. There are scattered hairs on all the joints, but on the last there is a well marked ventral fringe of setæ.

Ovigers.—These are ten-jointed and do not possess a terminal claw. Haswell's description is accurate except in relation to the length of the sixth joint, which is longer than any of the other distal joints.

Legs.—There is nothing to add to Haswell's description of these.

Cement glands are small and numerous.

Male genital apertures occur on all limbs.

Measurements, holotype, male, G5199.

	mm.
Proboscis, length	.81
greatest diameter	.58
Trunk, length	2.71
width behind first crurigers	.64
,, ,, second ,,	.53
width across ,, ,,	1.74
Cephalon, length	1.19
width	.91
Neck, width	.38
Abdomen, length	.31
Palp, first joint	.18
second ,,	.20
third ,,	.30
fourth ,,	.20
Third leg, first coxa	.47
second ,,	.94
third ,,	.63
femur	2.40
first tibia	2.80
second ,,	2.40
tarsus and propodus	1.29
claw	.60
auxiliary claw	.20

Remarks.—The specimens were obtained by dredging in Port Stephens, New South Wales, but the depth is not given.

I have provisionally placed this specimen in the genus *Pallene.* It does not agree with Hodgson's definition of this genus (1910 page 225) and just as little with that given by Schimkewitsch (1909, pp. 8-9). The presence of the four-jointed palp in the male is a feature in which the present species resembles *Pallene dimorpha*, Hoek, with which it also agrees in the following points—the independence of the posterior trunk segments, the forms of the spines on the ovigers, the finely-tòothed chelophores, and the possession of auxiliary claws. *Pallene dimorpha*, however, possesses a terminal claw on the oviger, which is absent in *P. valida* (see Loman, 1908, page 40).

The presence of the palps, in my opinion, would not allow of this species being included in the genus *Parapallene* as proposed by Loman.

If, as Thompson suggests (1909, p. 538) a new genus should be created, founded upon Hoek's description of *Pallene dimorpha*, then it is worthy of consideration that the new genus should be so defined as to include the species under discussion.

PSEUDOPALLENE PACHYCHEIRA, Haswell.

(Pl. XIX., fig. 9; pl. XX., figs. 10-11.)

1884, *Pallene pachycheira*, Haswell, 1884, p. 1030, pl. 57, figs. 6-9.

1908, *Parapallene pachycheira*, Loman, 1908, p. 47.

Specimen.—Australian Museum Collection, G5194, holotype ♂, Port Jackson.

Description.—*Body* is robust, smooth, with segments distinct.

Crurigers are separated by small interspaces.

Cephalon is expanded, strongly cleft in front.

Neck is short and wide.

Ocular tubercle is low and rounded, placed on posterior portion of neck.

Proboscis is inserted ventrally into the cephalon, directed obliquely downwards, very short, cylindrical at the base, conically pointed in front with a fringe of delicate setæ round the mouth.

Abdomen is short, tapering posteriorly.

Chelophores are strong and powerful. Scape is single, palm greatly developed with fingers hanging in front of mouth. Both fingers are wide, blunt, and untoothed. but bearing on each inner edge a single central rounded projection.

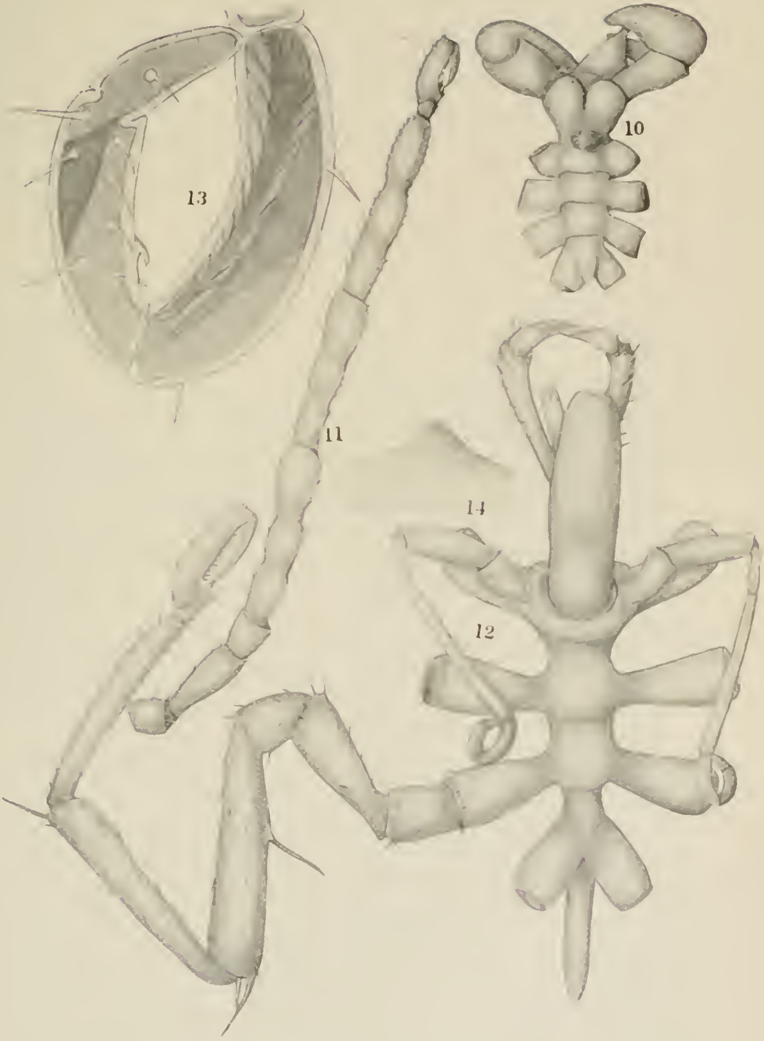
Palps are absent.

Ovigers possess ten joints and a claw. First joint is short, second, third, and fourth are progressively longer. Fifth joint is long curved and slender, distally expanded with a peg like process at this end, the process being crowned with a number of short setæ. Sixth joint is short, and the seventh, eighth, ninth, and tenth are progressively shorter. The last four joints are provided with a few bent compound spines arranged in a single row. The terminal claw is long and sharp and is ornamented with fine teeth on the distal half of its inner edge and on the distal third of its outer edge.

Legs.—The first and third coxæ are short and subequal. The second is as long as the other two together and is distally expanded. The femur is a long joint a little longer than the combined coxæ. The first tibia is a little shorter and expands distally. The second tibia is a little longer than the femur. The femur, first tibia, and second tibia are approximately divided into thirds by shallow transverse constrictions. All these joints are minutely spinous. The tarsus is short with a very small dorsal spine and a bunch of closely crowded ventral spines. The propodus is very stout, minutely spinous. On the sole, proximally, there are some four or five well developed spines. The distal half of the sole has smaller spines. The claw is large, strong, and curved, and is equal to more than two-thirds the length of the propodus.

Measurements, holotype ♂, G5194.

	mm.
Proboscis, length	.90
diameter	.56
Cephalon, length	.78
greatest width	.91
Neck, width	.54
Trunk, length	2.05
width between first and second crurigers	.45
width across second crurigers	1.44
Third right leg, first coxa	.45
second ,,	1.09
third ,,	.44
femur ,,	2.05
first tibia	1.82
tarsus and propodus	.93
claw	.51



T. T. F. del.

Pseudopallene pachycheira, figs. 10-11
Anoplodactylus tubiferus, figs. 12-14

Locality.—Port Jackson (depth not given).

Remarks.—The general bodily form, the shape of the short proboscis with its wreath of delicate hairs round the mouth, and the form of the chela fingers with their bud-like projections mark this species as belonging to the genus *Pseudopallene*, Wilson, rather than *Parapallene*, Carpenter, as suggested by Loman (1908, page 47). Haswell states that this species is related to *Pallene laevis*, Hoek. As a matter of fact the two differ in a very fundamental point since in *Pallene laevis*, each chelophore has a two-jointed scape, while in the present species the scape is simple.

ANOPLODACTYLUS TUBIFERUS, Haswell.

(Pl. XX., figs. 12-14; pl. XXI., fig. 15.)

1884, *Phoxichilidium tubiferum*, Haswell, 1884, p. 1032, pl. 57, figs. 1-5.

1889, *Phoxichilidium tubiferum*, Whitelegge, 1889, p. 233.

1908, *Anoplodactylus tubiferus*, Loman, 1908, p. 72.

1910, *Anoplodactylus tubiferus*, Cole, 1910, p. 288.

Specimens.—Aus. Mus. Collection, No. G5202, holotype ♂, Port Jackson; Sydney University Zool. Collection, 2 Micro. slides, ♂, P.J.; Sydney University Zool. Collection, 1 Micro. slide, ♀ P.J.; Sydney University Zool. Collection, 3 Spirit specimens labelled "Woollahra Point 2 or 3 fathoms."

There is very little to add to Haswell's description of the holotype The following is to be regarded as supplementary to the original description:—

Body narrow, *crurigers* well separated, longer than wide and expanded distally. *Trunk* is widest at anterior end, while each succeeding segment is narrower than the one immediately preceding it. In old animals segments are completely fused, in young ones only the hindmost two. Two characteristic dorsal spines occur on the body at the level of the second and third pair of crurigers.

Proboscis is of the shape described by Haswell. It is inserted into the ventral side of the cephalic segment which is continued beyond the insertion into the long well-defined and constricted neck characteristic of the genus *Anoplodactylus.* In front of this neck the *cephalon* is slightly expanded. Upon this expanded portion an extraordinarily high *ocular tubercle* arises. This is not mentioned by Haswell in his description, but is shown by him in plate 57, fig 1, lying just alongside the right cheliforus. The presence of this long cylindrical tubercle no doubt has suggested the name of the species. At the apex of this column are four distinct eyes.

Abdomen and *chelifori* are as described by Haswell.

Palps absent.

Ovigers absent in the female. In the male each oviger is six-jointed, and the joints have the proportions stated by Haswell. The third joint, however, has a slight constriction at about one-fifth the length of the joint from the proximal end. A few simple spines occur on the last few joints. Noteworthy is the presence of a peculiar bent spine on the ventral side of the penultimate joint about one-third the distance from the proximal end.

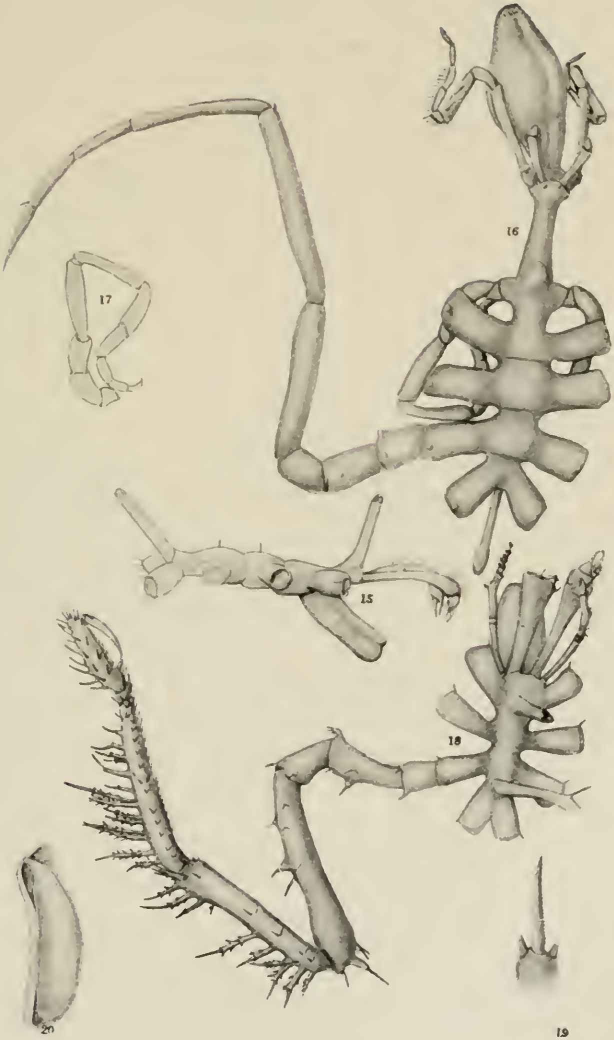
Legs.—These are as described by Haswell. The only alteration I have to suggest is that the particular spine of the second tibia is situated on a tubercle some little distance from the distal end.

Nervous system.—The nervous system of the species is well shown in some of the slides from the Sydney University Collection, and it is of interest to point out that the arrangement of this system varies a little from that indicated by Loman (1917, p. 83). He figures *Anoplodactylus* with but four ganglia, whereas most other pycnogonida have five, and suggests that owing to the reduction or disappearance of the ovigers and the absence of palps the anterior ganglion which innervates these two organs has fused with the succeeding ganglia. In the species under discussion, however, the anterior ganglion, although small, is present, but is in contact with the next succeeding ganglion.

Genital openings.—Male openings occur on small tubercles at distal end of second coxæ of the two posterior pairs of legs. *Female openings* on all the pairs of legs.

Measurements, holotype, male.

	mm.
Proboscis, length	1.36
greatest diameter	.38
Trunk, length	1.90
width across first pair of crurigers...	1.56
,, behind ,, ,, ,, ,, ...	.30
,, behind second ,, ,, ...	.30
,, ,, third ,, ,, ...	.19
Abdomen, length	.74
width near base	.13
Neck, width	.12



T. T. F. del.

Anoplodactylus tubiferus, fig. 15
Ascorhynchus longicollis, figs. 16-17
Nymphopsis armatus, figs. 18-20

	mm.
Ocular tubercle, height	.58
width near base	.12
Third right leg, first coxa	.36
second ,,	.66
third ,,	.42
femur	1.28
first tibia	1.24
second tibia	1.12
tarsus and propodus	.66
claw	.44

Remarks.—This pycnogonid has only been recorded from Port Jackson, where it occurs in various localities.

Affinities.—Loman (1908, p. 72) suggests that this species resembles his *Anoplodactylus stylops* from the Banda Sea.

Ascorhynchus longicollis, Haswell.

(Pl. XXI., figs. 16-17.)

1884 *Ammothea longicollis*, Haswell, 1884, p. 1028, pl. 56, figs. 1-4.

1889 *Ammothea longicollis*, Whitelegge, 1889, p. 233.

1908 *Ascorhynchus longicollis*, Loman, 1908, p. 32.

1909 *Eurycyde longicollis*, Thompson, 1909, p. 533.

Specimens.—Australian Museum Collection, G5195, holotype, female, Port Jackson; Australian Museum Collection, G5174, spirit specimen, probably male (ovigers missing), Port Jackson.

Description.—*Body* is long and slender with segmentation well marked. The *crurigers* are well separated from one another, and are much longer than broad. The third and fourth pairs are a little closer than any of the preceding pairs. The posterior pair are directed somewhat backward. Each cruriger possesses a well marked dorsal tubercle at the distal end.

Cephalon is very slightly expanded in front, and is continued backwards into a long and narrow neck. Above the base of each chelophore is a small tubercle. A little more than half the distance along the neck occur two prominent lateral "cervical processes" to which the ovigers are attached. Just dorsal to these is the *ocular tubercle*, a fairly prominent rounded eminence with visual elements poorly developed and not pigmented. Behind this the neck is slightly wider than in front.

Proboscis has the shape of a long oval and possesses a short scape. It is directed downwards.

Abdomen is long and narrow and slightly expanded at the apex.

Chelophores are as described by Haswell.

Palps consist of ten joints, not of nine as stated by Haswell. As Loman has suggested, the single basal joint in the original description really consists of two joints. The most proximal is short and thick, the next is quite small. The remainder agree with Haswell's description, except of course that in numbering the joints allowance must be made for the missing segment.

Ovigers are ten jointed. Unfortunately they are missing in the case of the spirit specimen. The length of the joints agrees with Haswell's account.

Legs.—Genital openings, female, occur on the coxæ of all legs. For the rest, there is nothing to add to Haswell's description.

Measurements, holotype, female G5195.	mm.
Proboscis, length	3.08
greatest diameter	1.41
Cephalon, greatest length	2.55
anterior width	.74
Neck, anterior width	.35
posterior ,,	.52
Trunk, length	5.23
width behind first crurigers	.57
width across second crurigers	3.30
Abdomen, length	1.54
Palp, first joint	.33
second ,,	.06
third ,,	1.45
fourth ,,	.48
fifth ,,	.92
sixth ,,	.22
seventh ,,	.44
eighth ,,	.48
ninth ,,	.33
tenth ,,	.36
Third leg, first coxa	.87
second ,,	1.10
third ,,	.80
femur	2.55
first tibia	3.96
second tibia	2.42
tarsus	1.18
propodus	1.10
claw	1.18

Remarks.—This species has only been recorded from Port Jackson (depth not stated). Although Thompson (1909, page 533) suggests that this specimen belongs to the genus *Eurycyde*, nevertheless the slender body, the large proboscis, and the simple scape of the chelophores, put it undoubtedly in the genus *Ascorhynchus*.

NYMPHOPSIS gen. Haswell.

Genotype *Nymphopsis armatus*—Australian Museum Coll. G5201.

1884 *Nymphopsis*, Haswell, 1884, p. 1025.
1887 *Nymphopsis*, Schimkewitsch, 1887, p. 272.
1906 *Nymphopsis*, Cole, 1906, p. 218.
1908 *Nymphopsis*, Loman, 1908, p. 49.
1909 *Nymphopsis*, Thompson, 1909, p. 534.
1912 *Nymphopsis*, Loman, 1912, p. 3.
1915 *Nymphopsis*, Loman, 1915, p. 201.

This genus was first defined by Haswell. His description is as follows:—

> " *First pair of appendages well developed, cheliform,*
> " *second pair well developed, palpiform with nine joints.*
> " *Third pair with seven joints, none of them provided with*
> " *compound spines.*"

In 1887 Schimkewitsch obtained another species (*N. korotnewi*) referable to this genus, and by comparing the characters of his own species with Haswell's description of *N. armatus*, came to the conclusion that Haswell's specimen was immature. Schimkewitsch therefore re-defined the genus as follows:—

> " *Ce genre presente les mandibules (I.) triarticulées, pas*
> " *cheliformes, les extremités II. 10 articulées, les extremités*
> " *III. 10 articulées, privées du crochet et des épines plumi-*
> " *formes, l'article tarsale (8) des extremités IV. - VII. est*
> " *muni d'épines basales et de crochets secondaires tout à fait*
> " *rudimentaires (au moins chez notre espèce).*"

Loman's (1908) definition goes much further, and in substance is as follows:—

> " *Body segments quite coalescent, lateral processes separate*
> " *Proboscis large, thick, and moveable; chelifori delicate, shaft*
> " *two jointed, pincers delicate, occasionally rudimentary in*
> " *older animals. Palps nine jointed, second and fourth joints*
> " *longest, the remainder short. Ovigers of male slender, fourth*
> " *joint very long also the second and fifth, distal joints small,*
> " *terminal joint long. No toothed spines, only hairs or plates.*

“ *Female oviger short, particularly the middle joints, feet*
“ *powerful. Cement gland as in Ammothea, accessory claws*
“ *small or absent. Female genital openings on all pairs (?),*
“ *male openings on posterior two pairs of legs. Eggs small,*
“ *larvæ with two large pincers without byssus gland and byssus*
“ *spine.*”

The genotype is an adult female with fully developed eggs in the two distal coxæ and femora of all the legs.

So far as can be made out (with exception of the ovigers referred to in the description of the species) Haswell's specimen agrees with Loman's definition of the genus.

Genus *Nymphopsis* includes the following species:—

Nymphopsis armatus, Haswell, 1884, p. 1025, Port Molle, 15 fathoms.

Nymphopsis korotnewi, Schimkewitsch, 1887, Iles de la Sonde, East Coast of Timor, 34 metres.

Nymphopsis muscosus, Loman, 1908, East Indies, 16-130 metres; Japan, 50-130 metres.

NYMPHOPSIS ARMATUS, Haswell.

(Pl. XXI., figs. 18-20; pl. XXII., fig. 21.)

1884, *Nymphopsis armatus*, Haswell, 1884, p. 1025, pl. 55, figs. 1-4.

1908, *Nymphopsis armatus*, Loman, 1908, p. 49.

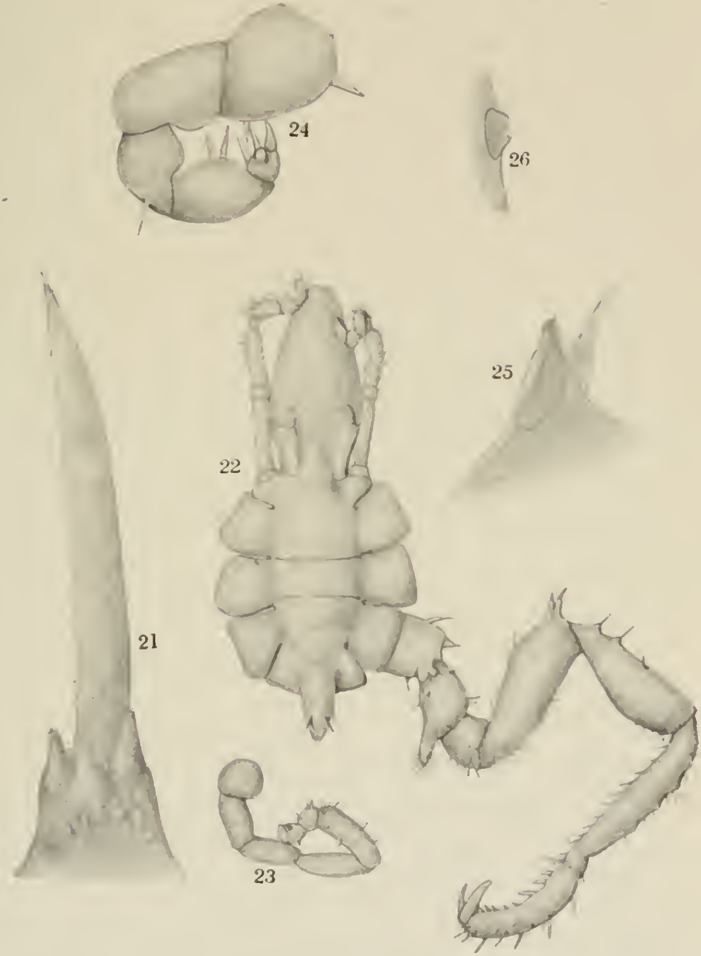
Specimen.—Australian Museum Collection, G5201, holotype, female, Port Molle.

Description.—*Trunk* is quite smooth tubular and tolerably slender. The portion behind the third pair of crurigers is narrower than that in front. Segmentation is absolutely suppressed. *Crurigers* are well separated at the base and diverge towards their extremities. The posterior pair extend almost directly backward. Each cruriger is distally expanded with a single dorsal spine.

Cephalon is very small.

Ocular tubercle is situated on the level of the first pair of crurigers and arises by a wide base narrowing above to form a fairly high almost perpendicular tube terminating in a bluntly conical apex. The eyes are large and strongly pigmented, the posterior pair being the smaller.

Proboscis is of large size. It arises by a wide base on the ventral side of the trunk at the level of the first pair of crurigers. It projects diagonally downwards. Its shape is that of an ellipse with the narrower end forward and truncated.



T. T. F. del

Nymphopsis armatus, fig. 21
Achelia assimilis, figs. 22-26

Chelophores are remarkable in shape. The shafts of the two chelophores arise from the anterior margin of the abbreviated cephalon, but are separated from one another by a distinct interval. The division of the scape into two joints is not apparent in the holotype. Each scape is longer than the proboscis and is quite narrow at the base, but expands distally to form a cup into which the terminal portion of the scape is involuted. To the bottom of this cup on the inside is attached the chela. The rim of the cup has a characteristic armature consisting of a series of some eight spines. Of these spines those of the ventral portion of the rim are short and simple, those on the dorsal side being larger and possessing each at its base a pair of short auxiliary spines. The chela is delicate; the palm is small, the fingers curved and untoothed. The movable finger is external. The fingers enclose a wide space, and their points cross at the apex. In its natural position the chela is more than half hidden in the cup. The involution is held in place by muscle fibres. It is possible that the chela can be protruded. (In the holotype slide the right chela cup has been evaginated, having broken from its fastening evidently under the influence of the pressure used in making the slide.)

Abdomen is a cylindrical tube extending almost vertically upwards. Its posterior side is somewhat concave—on the anterior side, near the apex, is a pair of papillæ each bearing a long simple spine.

Palps are evidently normally nine jointed, although the right palp only possesses eight joints. The palps arise laterally to and below the chelophores. The following description applies to the left palp:—The second and fourth joints are longest, the first and third short. The fourth joint is curved and possesses a distinct tubercle about one-third the distance from the distal end. On this opens the duct of the palp gland which lies in this joint (Hock, 1881, p. 105). The remainder of the joints of the palp are all small, the sixth being the longest of them. It forms an angle with the shorter fifth joint. The seventh, eighth, and ninth joints are all small. In the palps, the first and second joints are devoid of spines, the third and fourth have occasional spines and a distal fringe. The remainder of the joints are well provided with spines.

Ovigers.—It is a matter for regret that in the slide these appendages are so broken that it is impossible to count the joints. One portion which has altogether come apart from the animal consists of seven joints, but this is manifestly incomplete. The terminal joints are rolled up and seem to be provided with long hairs.

Legs.—First coxa is of normal length, second about twice as long—third a little longer than the first. All the coxæ are narrow proximally and distally expanded. The second coxa bears a well developed tubercle at its distal end, on which opens the female genital pore. This tubercle bears two long simple spines. The first and third coxæ have similar tubercles but not so well developed.

Femur is long and stout, slightly expanded at the distal end. Its spinous armature is very regular in arrangement. At one quarter the length from the proximal end there is on the ventral side a pair of small spines. About half way there are two larger spines each on a tubercle. At the distal dorsal angle there are a couple of pairs on tubercles, one of which is particularly large. All these have small subsidiary spines at their base. In nearly every case the simple looking spines on the coxæ and femur are found under the highest powers to be very minutely toothed.

First tibia is stout and not quite as long as the femur. It bears from ten to fifteen compound spines on the dorsal side. They are larger and more numerous on the anterior legs than on the posterior. Each spine consists of two segments. The proximal of these is long and cylindrical with large processes and also possessing a microscopic serration. The distal segment is long, sharp, and microscopically toothed.

The second tibia is about equal in length to the first tibia but is slenderer. It has about fifteen compound spines on its dorsal surface. These decrease in size and become simpler in structure towards the distal extremity. In addition to the spines mentioned above the first and second tibiæ possess a more obscure surface spination consisting of fine spines arranged in approximately longitudinal rows.

Tarsus is small, dorsal spine is absent, but there are some simple ventral spines.

Propodus is strong and curved with about a dozen long simple spines on the dorsal surface. The sole is armed with a number of spines varying in number from twenty-one on the anterior foot to fifteen on the posterior. These are re-curved spines, decreasing in size towards the distal end. Claw is long strong and curved. The auxiliary claws are rudimentary.

The *genital apertures*, female, occur on the second coxæ of all the legs.

Measurements, holotype, female.

	mm.
Proboscis, length	2.25
greatest diameter	.97
Trunk, length	2.40
width behind first crurigers	.56
,, ,, second ,,	.53
,, ,, third ,,	.44
greatest width across second crurigers	2.75
Cephalon, breadth	1.05
Ocular tubercle, height	.72
diameter	.24
Abdomen, height	1.46
smallest diameter	.19
Chelophore shaft, length	1.6
width at base	.24
greatest width	.67
Right palp, first joint	.10
second ,,	.87
third ,,	.06
fourth ,,	.76
fifth ,,	.22
sixth ,,	.20
seventh ,,	.10
eighth ,,	.06
ninth ,,	.05
Third right leg, first coxa	.65
second ,,	1.35
third ,,	1.04
femur	3.35
first tibia	3.30
first tibia, longest spine	1.17
second tibia	3.04
second tibia, longest spine	1.20
tarsus and propodus	1.56
claw	.97

Remarks.—This species was found by Haswell in Port Molle, Queensland, at a depth of fifteen fathoms.

ACHELIA ASSIMILIS, Haswell.

(Plate XXII., figs. 22-26.)

1884, *Ammothea assimilis*, Haswell, 1884, p. 1026, pl. 55, figs. 1-5.

1899, *Ammothea assimilis*, Whitelegge, 1889, p. 233.

1908, *Ammothea assimilis*, Loman, 1908, p. 59.

1913, *Achelia assimilis*, Bouvier, 1913, p. 140.

Specimens.—Australian Museum Collection, G5220, one microscope slide labelled "type." This contains three specimens, all immature, one of doubtful sex, the others female. Zoological Collection, Sydney University, one microscope slide containing two specimens (adult), both males.

As Loman has pointed out, Haswell's description of this species, published in the early days of Pycnogonid research, is not critical enough for present day purposes. I have, therefore, decided to give a full account of the species.

The slide in the Australian Museum marked "type" contains only immature specimens with chelate chelophores and immature ovigers. I cannot suppose that it was upon these specimens that Haswell's original description was based. The specimens from the University of Sydney were certainly the originals of Haswell's drawings, and no doubt it is an oversight that these were not designated as the types.

Description.—The *body* is disc like and broad, segmentation practically non-existant, *crurigers* closely approximated with no space between.

Cephalon is very slightly developed.

Ocular tubercle is situated near anterior edge of cephalon and is of medium length, rounded at apex, with eyes large, distinct, and pigmented.

Abdomen is of medium length, semi-erect, tubular, tapering and ornamented with a few spines towards apex.

Chelophores are imperfect in adult specimens. Scape is simple, chela rudimentary. The whole organ measures considerably less than half of the length of the proboscis.

Palps are eight-jointed, second and fourth joints are longest, remainder small. The last five joints are provided with hairs.

Ovigers (male) ten jointed. First joint small and about as long as wide, the second, third, fourth, and fifth are progressively longer, the remainder are small, the tenth being particularly so. The last four joints bear simple spines and there is a terminal spine. The five terminal joints are twisted into a spiral.

Legs.—The three coxæ are short, the second being a little longer than the others. The first coxa bears terminally a few simple spines each set upon a papilla. In the succeeding coxæ a distal fringe is present consisting of many delicate spines without papillæ. In the male the genital apertures occur on the second coxæ of the two posterior pairs at the apices of large genital tubercle. Femur is stout, expanded at distal end, a little shorter than the combined coxæ. The femoral gland ends on a well marked papilla situated distally and bearing a prominent spine. Some small spines occur with occasional longer ones on the dorsal surface. First tibia is also short and expanded armed in a similar fashion to the femur, to which it is about equal in length. The second tibia is stout, slightly curved, and about equal to each of the two preceding segments. The tarsus is small with a single dorsal spine and a ventral bunch of hairs. Propodus is stout, curved, sole being ornamented proximally with three large spines separated by a space, for the rest with about five or six spines which decrease in size towards extremity. Terminal claw is stout and curved, less than half the length of the propodus. Auxiliary claws are well developed.

Genital openings (male) are situated on genital tubercles on the two posterior pairs of limbs.

Measurements:—	mm.
Proboscis, length	.70
greatest diameter	.36
Cephalon, greatest width	.47
Trunk, length	.70
width across second crurigers	.78
Abdomen, length	.27
Chelophore, length	.31
Third right leg, first coxa	.19
second ,,	.25
third ,,	.22
femur	.55
first tibia	.56
second ,,	.58
tarsus and propodus	.52
claw	.20
auxiliary claw	.12
Palp, second joint	.27
third ,,	.05
fourth ,,	.24
fifth ,,	.08
sixth ,,	.06
seventh ,,	.07
eighth ,,	.08

Remarks.—Whitelegge (1889, page 233) records the locality of the species as Clark Island, Port Jackson.

Affinities.—Haswell suggests that this species is nearly related to *Achelia (Ammothea) langi*, Dohrn.

It is necessary to point out some errors in Haswell's description and drawings of this species. Fig. 5 shows the proboscis and palps, not the *first* pair as stated by Haswell. The basal joint of the palp is omitted. Fig. 6 shows the terminal joints of the palps, not of the first pair. Fig. 7 is evidently a representation of the oviger (third pair) not of the palp (second pair). This drawing is not quite accurate. There is an evident oversight in the description of the second pair (palps). This commences with an account of the structure of the palps but merges into a description of the ovigers.

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EXPLANATION OF FIGURES.

Plate XVIII.

Figs. 1-3.—*Rhopalorhynchus tenuissimus*, Hasw., holotype male.

Fig. 1.—Cephalon, dorsal view.

Fig. 2.—Leg.

Fig. 3.—Palp.

Figs. 4-5.—*Nymphon equidigitatum*, Hasw. (from spirit specimen).

Fig. 4.—Dorsal view, ovigers, palps and legs not shown.

Fig. 5.—Third right leg.

Plate XIX.

Fig. 6.—*Nymphon equidigitatum*, Hasw. (from spirit specimen).

Fig. 6.—Lateral view, legs removed.

Figs. 7-8.—*Pallene* (?) *valida*, Hasw., holotype, male.

Fig. 7.—Dorsal view, with third right leg.

Fig. 8.—Ventral vein of anterior portion of body (one chelophore not shown).

Fig. 9.—*Pseudopallene pachycheira*, Hasw., holotype, male.

Fig. 9.—Ventral view (legs and chelophores not shown).

Plate XX.

Figs. 10-11.—*Pseudopallene pachycheira*, Hasw., holotype, male.

Fig. 10.—Dorsal view (legs not shown).

Fig. 11.—Third right leg.

Figs. 12-14.—*Anoplodactylus tubiferus*, Hasw. (from spirit specimen).

Fig. 12.—Ventral view (♂), with third right leg.

Fig. 13.—Terminal joints of oviger.

Fig. 14.—Sexual aperture (♂).

Plate XXI.

Fig. 15.—*Anoplodactylus tubiferus*, Hasw., female.

Fig. 15.—Lateral view, legs removed.

Figs. 16-17.—*Ascorhynchus longicollis*, Hasw., holotype, female.

Fig. 16.—Dorsal view, with third left leg.

Fig. 17.—Oviger (female), spines not shown.

Figs. 18-20.—*Nymphopsis armatus*, Hasw., holotype, female.

Fig. 18.—Dorsal view, showing third left leg.

Fig. 19.—Spine from rim of chelophore.

Fig. 20.—Palp gland.

Plate XXII.

Fig. 21.—*Nymphopsis armatus*, Hasw., holotype, female.

Fig. 21.—Simple spine from leg.

Figs. 22-6.—*Achelia assimilis*, Hasw., male (drawn from slide in Dept. of Zoology, University of Sydney).

Fig. 22.—Dorsal view, showing third right leg.

Fig. 23.—Oviger (male).

Fig. 24.—Terminal joints of oviger (male).

Fig. 25.—Cement gland.

Fig. 26.—Gland from 2nd tibia.

NOTE ON THE OCCURRENCE IN TASMANIA OF THE FRESHWATER CRAB, *HYMENOSOMA LACUSTRIS*, CHILTON.

By Chas. Chilton, M.A., D.Sc., C.M.Z.S.,

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(Communicated by Professor T. Thomson Flynn.)

(Received 8th July, 1919. Read 11th August, 1919.)

Professor T. Thomson Flynn, of the University of Tasmania, of Hobart, has been good enough to send me some specimens of a small crab obtained by him in North-West Tasmania, which he thought belonged to the species *Hymenosoma lacustris*, Chilton, though they appeared to differ from the published descriptions in the shape of the rostrum and in some other points. The few specimens he collected were found nestling in the crevices of rotting wood in a very small creek in the middle of an open paddock near Flowerdale.

This species was originally described from specimens obtained in Lake Takapuna, near Auckland, New Zealand, and has since been recorded from other localities in New Zealand, also from Norfolk Island, Lord Howe Island, and from two localities in Victoria, Australia. Its occurrence in Tasmania is additional evidence of its wide distribution, and its antiquity. I have compared the Tasmanian specimens with those from the other localities, and consider that they should be placed in the same species. The rostrum is more sharply depressed than in the Victorian specimens, more truncate at the end, and its lateral margins are more raised, showing prominently in dorsal view. In the Victorian specimens the rostrum is more nearly horizontal, its margins are less prominent, and the end is somewhat narrowly rounded. The Norfolk Island specimens have the rostrum, on the whole, similar to that of the Victorian, but the end is more broadly rounded; in the Lake Takapuna specimens the rostrum is much depressed, and the margins are sharply raised, but the end narrows to a blunt point, instead of being regularly rounded.

Other differences between the specimens then known in the lateral teeth on the carapace, the hairiness of the carapace and appendages, and in the teeth or tuberculations on the chelipeds of the male were pointed out in 1902 by Fulton and Grant. The Tasmanian specimens resemble those from Norfolk Island in having the lateral teeth almost entirely absent, the anterior one being only faintly indicated; in Lake Takapuna specimens both teeth are fairly distinct, the anterior one being prominent, though bluntly rounded at the end. The Victorian specimens show a somewhat intermediate condition. The male specimens from Tasmania are small, and have the chelipeds smooth, but this may be due to immaturity. After examining a number of specimens Fulton and Grant found that the various characters mentioned were not constant, and I agree with their statement that a large number of adult males from each locality must be examined before we are in a position to divide them into separate species or sub-species. The special characters of the Tasmanian specimens are, in my opinion, not sufficiently distinct to warrant their separation from the others, and they only help to show how difficult it will be to find constant combinations of characters by which to distinguish the different forms. Any investigation of this kind can, however, be safely left for future solution: the important point at present is that we have the same form of freshwater crab still existing in lands now widely separated. I have drawn attention to the importance of this fact in a previous paper (Trans. N.Z. Inst., Vol. 47, p. 316).

For the convenience of Tasmanian zoologists I give below the chief references dealing with the subject, and also the general description of the crab, which I published in 1915.

HYMENOSOMA LACUSTRIS, Chilton.

Elamena (?) *lacustris*, Chilton, Trans. N.Z. Inst., vol. 14, p. 172.

Hymenosoma lacustris, Chilton, l.c., vol. 15, p. 69, pl. 1. fig. 2 a to e; vol. 47, p. 316; and P.Z.S. for 1906, p. 703.

Hymenosoma lacustris, Fulton and Grant, Proc. Roy. Soc. Victoria, vol. 15, p. 59, pl. 8.

"Carapace nearly circular, rather broader than long; "flat, naked, or with a few scattered hairs. Rostrum "broad, strongly depressed, its upper surface concave from "side to side, extremity in form of an obtuse angle. "Antero-lateral margins of the carapace with 2 obscure "teeth. Cheliped of male small, propod only slightly "broader than the carpus, hairy. Ambulatory legs some-

" what densely covered with long hairs, tarsi long, slender,
" compressed, densely haired. Last pair of legs somewhat
" shorter than the preceding. Abdomen of male of 5
" joints subequal in length, 3rd rather narrower than the
" 1st and 2nd, 4th nearly as wide as the 3rd, last
" broadly rounded at the end; margin fringed with very
" short hairs, some longer ones being scattered on the
" surface. Abdomen of female with slight median ridge
" along its whole length."

STUDIES OF TASMANIAN CETACEA.

Part III.

Tursiops tursio.

Southern Form.

By

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and

Clive E. Lord (Curator, Tasmanian Museum, Hobart).

Plates XXIII.-XXV.

(Received 21st July, 1919. Read 1st September, 1919.)

In foregoing papers we have dealt with (i.) *Orca gladiator*, *Pseudorca crassidens*, *Globicephalus melas*, and (ii.) *Ziphius cavirostris*. In the present instance we desire to place on record certain data relating to *Tursiops tursio*, and to show reasons why it should be included as an inhabitant of the Australian Zone. In a succeeding paper we hope to publish certain facts concerning *D. delphis*.

The genus *Tursiops* should not be confounded with that of *Tursio*, which latter genus, with very little readjustment, might well be relegated to mere specific rank, for it is closely involved with other genera—for example, *Prodelphinus*.

Gray used the designation *Tursio* in 1862, but, as it had been previously used by Wagler for another genus, Gray's designation lapsed, and *Tursiops* was substituted. *Tursio*, however, is still retained for its correct genus, which explains why care must be taken to differentiate between the two genera.

In all lists of Australian Cetacea the representative of the genus *Tursiops* inhabiting these seas is given as *T. catalania*, the species being founded by Gray in 1862. (1) As has been observed by several authorities (2) of the numerous species described of this genus, it is very difficult to satisfactorily differentiate them from the main form of *T. tursio*. In this connection we would again draw attention to the remarks made in our previous

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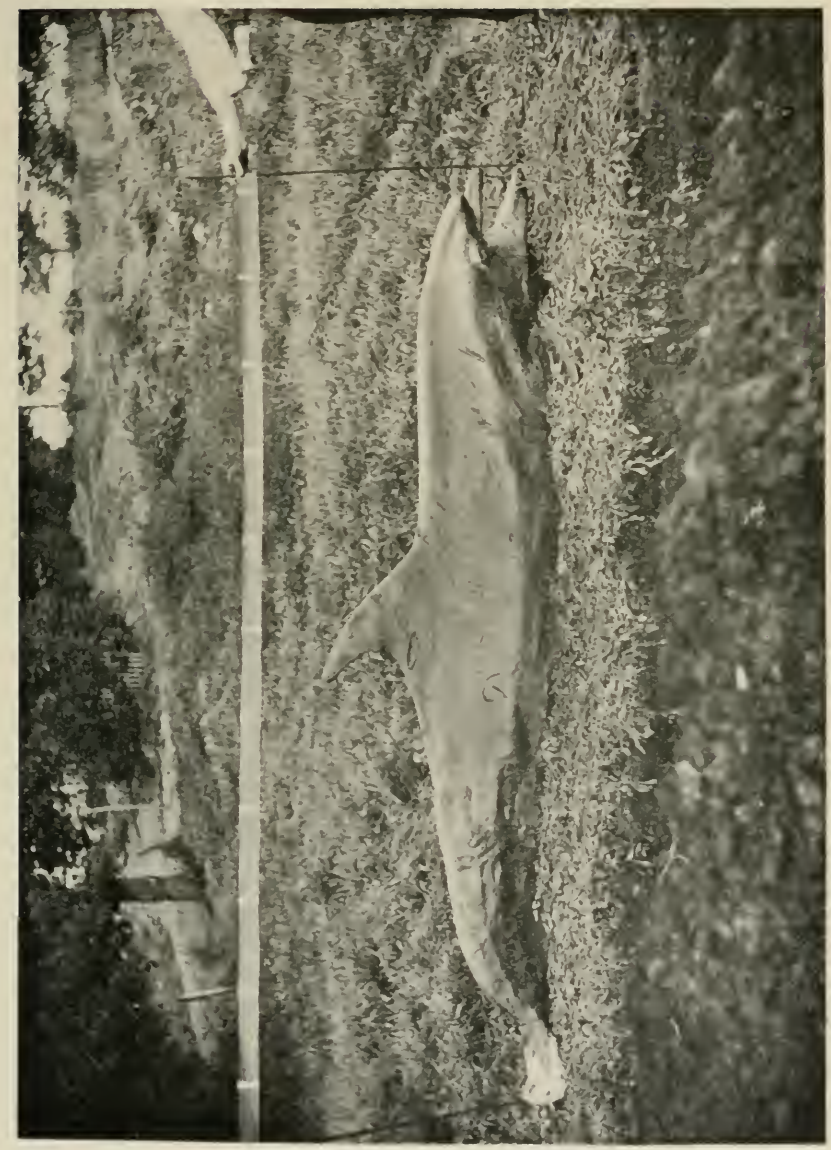
(1) Gray; *Delphinus catalania*, Proc. Zoo. Soc. Lond., 1862, p. 144.
,, *Tursio catalania*, B.M. Cat. S. and W., 1866, p. 262.

(2) Among others by Beddard, Camb. Nat. Hist. Mammalia, p. 379.

Plate XXIII.



TURSIOPS TURSIO

paper concerning the manner in which both genera and species of the Cetacean order have been created in the past. (3) These remarks apply with added force to the *Delphinidæ*, as pointed out in strong terms by Professor Flower, (4) when writing concerning Dr. Gray's tendency to multiply species.

Since Gray published his original description it has been usual to refer to the Australian form of *Tursiops* as *T. catalania*, and to eliminate *T. tursio* as an Australian species. We propose to show that *T. tursio* is to be found in the Australian Zone, and, further, that we have certain material which may relate to the species *catalania*. Our present opinion regarding this second species is mainly based on a study of the vertebræ, which differ in a remarkable manner from the typical *Tursio*. Unfortunately, Gray's original description of *catalania* is founded mainly on a rather vague description of the osteology of the skull. We hope to gather further material in the future regarding this presumably second species, and to place our observations on record. In the present instance we will confine our attentions to showing that there is in Australian seas a species which simulates very closely that of the European *T. tursio*. The distribution of this species is evidently cosmopolitan, but, in order to make a slight local distinction, we propose to refer to the species in the vernacular as "The Southern Form."

As Gray's original description is not readily available to many Australian students, it has been considered advisable to refer to portions of it in detail. Particularly so as it has an important bearing on the present paper. Gray stated (5) *inter alia*:—

"Mr. John Macgillivray has sent to Mr. Cuming, who " has transferred them to the British Museum collection, " two skulls of a species of Dolphin or Bottlenose which he " regards as probably new. These skulls were accompanied " by the following notes:—

"Delphinus, N.S. The larger of the two skulls be" longed to an individual killed off Cape Melville (within " the Great Barrier Reefs), north-east coast of Australia, " September 5th, 1860. It was a female, 7½ feet in length. " . . . The smaller of the two skulls represents another of the " same species. It was considerably smaller than the " first one, being only 6¾ feet in length. . . The two skulls " differ in shape and size. No 1 is 17 inches long; the " beak to the notch is 10 inches, and the upper teeth-bone

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(3) Pap. and Proc. Roy. Soc. Tas., 1919, p. 6.

(4) Flower, Proc. Zoo. Soc. Lond., 1883, p. 466.

(5) P.Z.S., 1862, p. 143.

" 8½ inches long; the front lower teeth are worn away and " truncated, like the teeth of the common *Delphinus* " *tursio*, which was described as *D. brunatus* by Montague. " There are twenty-seven teeth on each side in the upper, " and twenty-five teeth on each side in the lower jaw. No. " 2 is seventeen inches long; the beak 9½, and the upper " tooth-bone 8 inches long. The teeth, twenty-four above " (perhaps one on each side is deficient, as the end of the " jaw is very tender), twenty-three or twenty-four below. " The front teeth are slightly truncated, but this skull " differs from No. 1, being rather more convex and rather " narrower, especially in the hinder part, from the middle " of its length."

Gray continues:—"I have compared these skulls with " those of the different species of Bottlenoses (*Tursio*) in the " British Museum; and they are perfectly distinct from any " of them. The species may be called *Delphinus catalania*. " It is smaller in size, and has a much smaller brain cavity " than *D. cymodice* (Gray, Zool. Erebus and Terror, t. 19) " and *D. metis* (Gray, Zool. Erebus and Terror, t. 18), and " the beak is not so tapering as in these species, and the " teeth are rather more numerous. It is equally distinct " from *Delphinus eurysome* (Gray, Zool. Erebus and Terror, " t. 17), believed to be from the North Sea. It is not easy " to point out the distinction of these species in words; but " there cannot be a doubt about them when they are com- " pared together."

In 1883 Professor Flower (6) devoted considerable attention to the genus under review, and made several observations regarding the sex characters of *T. tursio*. We desire to quote certain of Professor Flower's remarks, and also to place in italics the portions which agree with our own observations. In this manner will be seen the remarkable similarity which exists between the Tasmanian form and the species examined by Flower, who stated *inter alia*:—"*In the males the rostrum is larger and compara- " tively narrower. The intermaxillaries are mor prominent " and convex, especially in their posterior half; in this region " the external border of the maxillaries is almost parallel to the " corresponding portion of the intermaxillaries;* the crests of " the cranium are more elevated and less sloping laterally. " *The heads of the females are remarkable for the breadth of the " rostrum at its base and its middle point; the rostrum conse- " quently has a more triangular form; the intermaxillaries are " more flattened; the exterior border of the posterior portion of " the maxillaries is not parallel to the external border of the*

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(6) Flower; P.Z.S., 1883.

"*intermaxillaries, but has a rounded projection outwards. The* "*cranium of the female is relatively a little broader than that* "*of the male;* its height is the same in the two sexes. *The* "*mandible is a little more elongated in the male.*"

Professor Flower summed up his remarks on the genus as follows:—

"1. *T. tursio*, including those that have been named "*Metis*, *Eurysome*, *Cymodice*, *Aduncus*, and *Gilli*, some "of which may be specifically distinct, but, if so, are very "closely allied, and still require definite elucidation of "their characters, the principal differences observed in "the skulls depending on the comparative breadth of the "rostrum, a character much influenced by sex. *T aduncus* "(*T. abusalam*, Gray) differs from the rest only in its "superior size."

"2. *T. catalania*, of smaller size than any of the "otners, and with smaller and more numerous teeth. "There is truth in the remark with which Dr. Gray "concludes his original description."

One of the most recent reviews of this genus which we have had the opportunity to see is that by Dr. Beddard (7) in 1900. He points out *T. tursio* is the only satisfactory type of the genus, and gives as apparent synonyms *Delphinus truncatus*, Montagu; *D. metis*, Gray; *D. cymodice*, Id.; *D. eurynome*. He allows, with certain provisional remarks, *T. catalania*, Gray; *T. abusalam*, Ruppell; *T. gilli* and *T. parvimanus*.

As regards *T. catalania*, Dr. Beddard points out that the species is of small size, and the colour is the same as *T. tursio*, except that the sides are covered with blotches of darker colour. The beak is also relatively longer. The species is admitted both by Sir W. Flower and Mr. True.

We would like to draw attention to the fact that, although *T. catalania* was originally described from two specimens obtained from the north-east coast of Australia, successive writers have included it as the representative of genus for the whole Australian Zone, and have not included *T. tursio*. We have not had the opportunity of examining specimens from the type locality and other sections of the Australian coasts, but there can be no question concerning the occurrence of a Southern form of *T. tursio* in Tasmanian seas. As regards the second species, as stated elsewhere, we hope to gather further material.

The question of external colouration is worthy of mention, but we are of opinion that too much attention should not be paid to variability of colour as regards specific classification. The usually accepted definition as regards the external colour of *T. tursio* is that the upper surface is lead colour and the under surface white. Beddard, however, quotes (8) an instance mentioned by Van Beneden of specimens which were intense black, except for a white streak on the ventral surface. The two specimens with which this paper chiefly deals were of deep and polished black on the upper surfaces, and slate coloured on the under surfaces. The colour being the same in both sexes.

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(7) Beddard: A Book of Whales, p 273.

As regards the vertebral formula, our specimens showed C. 7; D. 13; L. 17; Ca. 28-65.

INTRODUCTORY AND PHYLOGENETIC.

As Anthropotomists are apt to refer rather loosely to "vestiges of the cartilaginous cranium," we wish to make our position quite clear prior to introducing the several data that go to make up the present section of our paper. If we assume that the history of the cartilaginous skull has, in the main, been correctly read, we still have to face the fact that a cartilaginous tract, that by ostosis has taken its place in the bony skull, may revert to its former cartilaginous condition if the pressure of external evolutionary conditions so compels it. In an instance such as this is, it would be manifestly incorrect to call such a structure "a vestige of the cartilaginous cranium," since that summary method of dismissing the case would occlude all the interesting facts of its racial history. As it is, in this latter connection, that we have to deal with, part of a cartilaginous tract, in the Dolphin's skull, we desire to avoid any ambiguity—hence this statement.

Between the ossified pre-frontal bone (Ethmoid, of Flower, and others), the frontal, and in part the nasals, of a common Dolphin's skull there remains a strip of cartilage that may, or may not, ossify. It is a moiety of the ethmo-cartilage, but is not a relic of the cartilaginous skull, since, as far as our researches go, it relates to the ethmo-turbinals, which always ossify in part in intra-uterine life, and, *in toto*, at a very early period—certainly before the septal portion of the ethmoid, or, as we here term it, the coalesced pre-frontals. If no whale ever ossified this cartilaginous tract, and, therefore, never showed any ethmo-turbinals at all, we might assume this to be a pre-mammalian racial character, and push the ancestry of the whales back to an early date, and call

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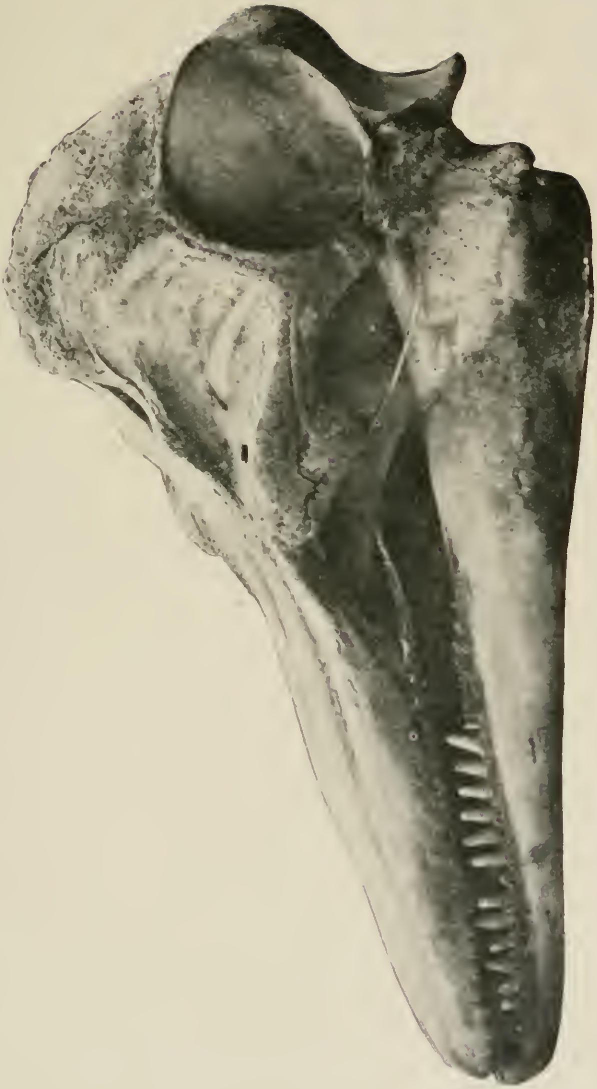
(8) Beddard: A Book of Whales, p. 275.



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this cartilage a chondro-cranial relic, or anything else of a like nature, but the Rorquals show well developed ethmo-turbinals, and other whales also in part develop the sense capsules. Accordingly we are really dealing with a suspension of ostosis, under pressure of racial evolutionary needs. Retaining this thought in the mental foreground, we set out to examine this cartilage in various Dolphins' skulls, with the following results.

1. We are impressed with the fact that the enormous variation of a Dolphin's skull in the nasal regions, must have first retarded the ostosis of a considerable area; next, tho ossific processes acting upon the now changed, and modified area, accelerated ostosis in some parts, and retarded it in others. As an illustration of accelerated and extended ossific energy, we may cite the vomer in Dolphins' skulls. Its basic position insures an early ossification of all its parts, which is sufficiently complex, by the way, to rule out the term "azygous bone," since it not only extends enormously forwards, but posteriorly expands over the whole sphenoid element, and even reaches the basi-occipital. Looking to other vertebrates, we find that Tonkoff, in 1902, saw its paired origin indicated in the bird, although frequently overlooked. In the crocodile it practically has three centres, two giving rise to the palatine moieties, and a third to a central portion that is embraced by the pterygoids. Traces of this latter appear in Dolphins' skulls, while to crown all we get the additional extension backwards just cited. Sir W. Flower was always careful to point out that so-called "azygous bones" were only those whose compound origin was so remote as to be uneasy to trace, a fact our studies have served to recall.

3. As an instance of retarded ostosis, we may name the ethmo-nasal regions of Dolphins' skulls.

4. In very young Dolphins' skulls the whole of this area, including the pre-frontal, and nasal regions, retains the condition of a more or less semi-cartilaginous state, showing its recent evolutionary remoulding. The same skulls, however, will have the vastly extended vomer, completely, and perfectly ossified (including even its basi-sphenoidal plate).

5. The manner in which the bony elements at tho vertex of Dolphins' skulls blend, and inter-blend, according to the various factors of genera, is extremely interesting, as note.

In *Delphinus*, the nasals early fuse with two lateral strips of the ethmoid cartilage, and so extend down the sides of the coalesced pre-frontals, that line the back of the nose. This is an ethmo-nasal ankylosis.

In some skulls these lateral ethmo, bony moieties, remain distinct, showing that they are not really parts of the nasals; this, however, is rare, and quite individual. The rest of this cartilage, that is the central portion, may remain as cartilage throughout, or ossify to both nasals, and pre-frontals. This latter is an ethmo-naso-pre-frontal ankylosis.

In *Tursiops*, the nasals early in life remain as two bosses at the vertex of the skull, and always show this basic character. Whatever may happen, later, will follow lines well marked off from those obtaining in the true Dolphins' skulls. We may cite the following, by way of illustration.

The ethmo-cartilage in skulls of *Tursiops*, is less compressed than in those of *Delphinus*, and in the centre it may ossify as two tongue-like strips, that appear above the upper end of the pre-frontals. These are very suggestive of the ethmo-turbinals, and accordingly we so name them. We have skulls that show this very well, indeed. The assumption here is, that the arrested ossific power is returning to earlier evolutionary states, much in the same way that Wormian ossicles appear in human skulls. Exactly how much, or how little, this strip of ethmo-cartilage will manifest definite ossific moieties, will depend upon various circumstances, one of which appears to be the effect of pressure. Still dealing with *Tursiops*, we may note that the vertex of a most carefully prepared skull will show the following bones, in addition to the maxillæ and frontals.

1. Two ossicles that represent the Interparietal and Pre-interparietal. (9)
2. The two true nasals, which combine with any, or all of the other moieties in that region of the skull, according to individual, and sex variations.
3. Two, Ethmo-turbinals.
4. Two, more or less plate-like lateral moieties that fuse with the pre-frontals, the frontals, and nasals, in various ways. These may fuse to extinction upon one side, and remain distinct upon the other.

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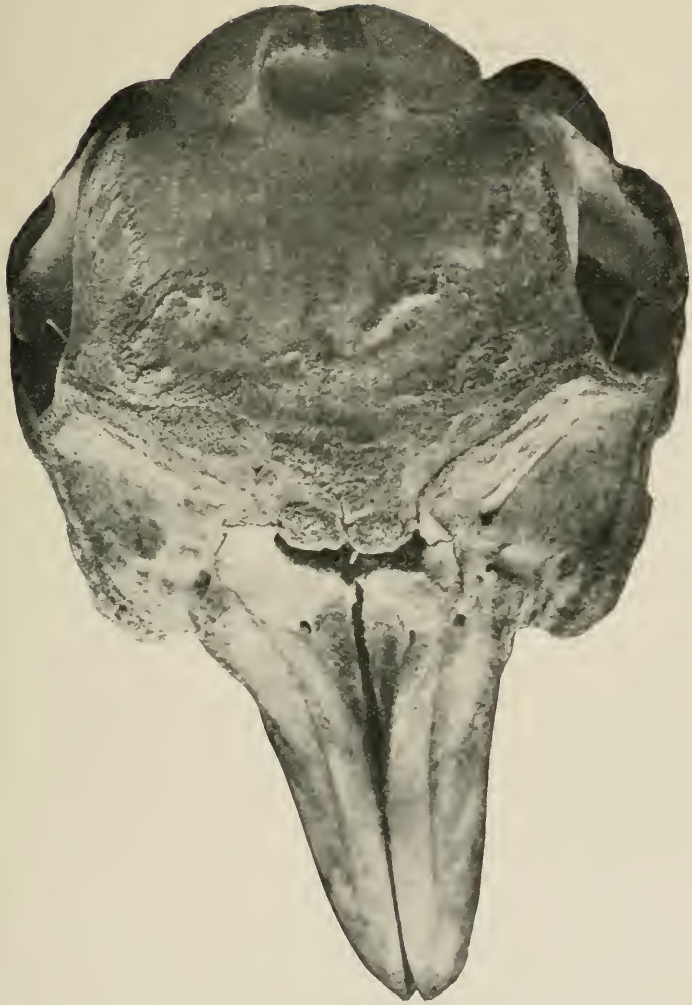
(9) Pre-interparietal not always present.

Plate XXV.



TURSIOPS TURSIO.

5. If they fuse, they may do so either most strongly to the frontal, or similarly to the pre-frontal. Again, the whole mass at the vertex may fuse to extinction, and the ethmo-turbinals remain as cartilage.

The latter state is nearest to the skull of *Ziphius cavirostris*, as represented in the Hobart Museum Osteological collection. By the usual methods adopted in cleaning Museum cetacean crania, either this region of a Dolphin's skull is left, immersed in muscle and cartilage, or else it is so mutilated in the attempt to remove such animal matter, that it is useless to a student. Our notes are made from skulls that took at least two years to prepare, every microscopic fragment of bony tissue being retained in position, and every microscopic fragment of animal matter having been removed by isolated maceration, thus avoiding a chance blow from other bones. In this way only is it possible to retain spongy bone, and to define the bounding lines of ostotic action. Beach worn specimens often help to elucidate a point, here and there better than imperfectly macerated ones, but it is sure to happen that the very piece most urgently needed has been ground away.

To correctly work out all these points it is essential to disarticulate a young *Tursiops* skull, and trace the respective elements into the cranial cavity, and unless the fronto-occipital sutures are carefully separated, some of the evidence will be lost.

Phylogenetically, all this means that the ancestor of the Dolphin group manifested well-developed ethmoidal sense capsules, the ossific processes relating to which were arrested. A cartilaginous remoulding took place, and later on a partial ossification of some parts, with a tendency to reproduce others, in a state similar to that of the Wormian ossicles of human crania. We close these notes as we began them, by saying these are not vestiges of the cartilaginous cranium.

TURSIOPS TURSIO.

Southern Form.

The males of this genus closely approach the size attained by the females of the genus *Globicephalus*, and, although the maximum size has still to be recorded, it is certain that they reach eleven feet. The females, in our opinion, never exceed ten, the vast majority being a full foot shorter.

Tursiops furnishes a most useful text for an osteological study, as the genus—in point of size—is midway between the Orcas upon the upgrade, and the porpoises upon the down grade. The common Dolphin, which ranges in our seas up to eight feet in length, presents osteological characters worthy of a separate study, and, therefore, in this paper it is proposed to present a comparative study of the male and female *Tursiops*, rather than to contrast with *Globicephalus* or *Delphinus*, as would most commonly obtain.

MALE SKULL.

The occipital condyles are very heavy in appearance, and divergent upon their upper margins, so that the space between them and the magnum foramen—with which their upper ends terminate—is exactly two inches, while three-quarters of an inch below the foramen they have so contracted that the intervening space is only three-eighths of an inch. From this point, however, they again diverge in a rounded curve to their bases—a fourth of an inch lower down. The magnum foramen is buried away under the overlapping condyles, which latter form two hollow grooves along its margins, terminating above in two deeply marked pits. The foramen itself measures $1\frac{3}{4}$ x $1\frac{3}{4}$ inches, and is arched, rather than notched, upon its upper border in the individual skull here used for descriptive purposes. Some male skulls, however, available to us, show the notch most distinctly, while female skulls, apparently, have the magnum foramen transversely oval, and quite devoid of either notch or distinct arch. When large numbers of these skulls, of various ages, and both sexes, are available for direct comparison, it will most probably be shown that the following facts obtain:—

1. All young *Tursiops*' skulls have a transversely oval magnum foramen.
2. The majority—if not all—females retain this form throughout life.
3. Adolescent males show the inception of the upward enlargement of the foramen, in the immediate centre of the upper wall, and thus constitute "a notch."
4. Later in life, the edges of the notch become absorbed, as the needs of the medulla oblongata demand, and the "arched" upper edge of the foramen is the result.

Thus it will be noted that a transversely oval foramen —and, therefore, one of unequal measurement—is converted into one whose central measurements are equal in both directions.

If a line is drawn horizontally across the vertex of the skull, it will be found to be exactly five inches above the upper wall of the magnum foramen.

The par-occipital processes have thickened borders, are concave as they contribute moieties to the otocrane—they are notched for the passage of the nervus vagii. Mesiad—they are confluent with the basi-occipital, and basi-sphenoidal plates of the otocrane. A ridge marks the occipito-sphenoidal suture, but the spheno-sphenoidal suture is overlapped by the enormously extended vomer. The whole of the vertex of the skull is rough and granulated, even at times raised into bony callosities, and the sutures proper to this region stand out as ossified ridges. The line of the super-occipital—as viewed in profile—is that of an "ogee," hollow above the magnum foramen, and rounded higher up. A line vertical to the basis crani, and made to touch the occipital condyles, would stand away from the deepest part of the curve of the ogee, an inch and three-quarters.

The temporal fossæ are largely composed of the parietals, which are ridged above, and continued posteriorly as two wings that extend a quarter of an inch beyond the line of the super-occipital. These ridges slope backward and downward, finally losing themselves at the exoccipito-squamosal sutures, having upon all their faces, made open parabolic curves. In macerated skulls these curves are very symmetrical, but in old beach-worn specimens they always suffer much mutilation. The pre-maxillaries expand over the maxillaries at their upper ends, and form two hollow grooves. The maxillaries cover the whole of the frontals, except a wedge-shaped strip on either side of the skull, the bases of these wedges being turned towards the "blowers." In point of size, the frontal strip thus exposed does not exceed one and a half inches, but may vary considerably within this limit in individual skulls. When a line is drawn—mesiad—from the tip of the skull beak to the vertex, the upper edges of the maxillary wings subtend angles of 78 degrees to it Over the zygomatic arches, the maxillary wings are much thickened—in male skulls of this genus—as much so relatively as in *Globicephalus* and *Orca*, but female skulls show very little super-ossification in this region. As far as our knowledge goes, no female *Tursiops* skull ever shelves here, as obtains in *Delphinus*. It is simply a matter of less super-ossification, incidental to lower muscular power. The post-orbital processes of the frontals make such shallow curves. anteriorly, that it is best to regard them as lines, and, as such, they subtend angles of 60 degrees to the tops of the arches, formed by the united surfaces of the maxillo-frontal elements. On either side of the skull, the frontals are seen to protrude beyond the maxillaries in this region. The post-orbital processes approximate the zygomatic processes of the squamosals to within a quarter of an inch. As in all the *Delphinidæ* of the normal type, the malar bones have been disrupted, and are functionally superseded by the powerful bony arches, composed of the orbital moieties of the frontals, maxillaries, and incidentally the zygomatic processes of the squamosals. The malar bones are six inches long, measured in a straight line from their ant-orbital junctions, with the super-orbital plates of the maxillaries, to their terminations at the zygomatic processes of the squamosals.

In male skulls—such as those under review—the pre-maxillaries, when viewed in profile, give the following results. From the narial basin they arise with a well-marked curve to the middle of the beak, next depress to form a well marked hollow, elevate again, and, lastly, slowly shelve off to the tip. In female skulls, the beak is much more depressed, and unless one had noted these curves in the male skull they would hardly be looked for. Having once noted the well-marked profile of the male, the more easy curves of the female manifest themselves quite naturally, although so slightly marked.

The pterygoid bones are separated in male skulls by the very small space of one-sixteenth of an inch.

As in the skulls of *Globicephalus*, the pre-maxillary and vomer appear in the palate.

The broken and spongy alveoli (here and there absorbed) suggest the following dental formula:—

$$\frac{24\ .\ 24}{20\ .\ 22}$$

In a general way anything up to 25 teeth may be present, and even in old animals some of the posterior teeth never function, as we have evidence to show.

As we hold perfect skeletons of the two sexes of the Tursiops, we propose to give comparative measurements, this being, in our case, an exceptionally fine opportunity for such a method of presenting the facts, since both animals were obtained in the flesh. Both animals were fully matured. as their skeletons prove, the male was ten feet eight and a half inches, between vertical rods, and the female was exactly nine feet in length.

Having dissected these animals, and prepared their skeletons, we have every confidence in saying they represent normal sex types of the genus, and that the data may be relied upon accordingly.

COMPARATIVE SKULLS.

Character of Measurement.	Male Skull. in.	Female Skull. in.
From tip of beak to occipital condyles	21	19
Internal length of the brain cavity	6¾	6
Maxillary notch to tip of the beak	11	11
Tip of beak to superior nares	14	14
Length of palate in a middle line	12¾	12¾
Tip of beak to end of alveolar margin	10	9¾
Height of skull at vertex	8¾	8
Breadth at squamosal processes	11½	10
Breadth of brain case at parietals	8	7½
Ditto of brain superorbital ridge	10	10
Ditto across beak at base	5½	5
Ditto across middle of beak	4	3¾
Ditto of pre-maxilla	2	1⅞
Width of condyles	4¾	4½
Height of foramen magnum	1¾	1⅜
Width of foramen magnum	1¾	1⅞
Length ot ramii of lower jaws	19½	16¾
Height of ramii at coronoid processes	4½	3¾
Length of tooth line	9½	9½
Length of symphysis	2¼	2½

A glance at this table will show the curious manner in which the male and female skulls simulate each other in the vast majority of their measurements, and yet sharply contrast in the length of the lower jaws. A single ramus can without fear be sexed so constant is this character; the ramii of adult males nearly reach 20 inches, and the females as nearly reach 17 inches. The notes already given as to the skulls and their profiles will serve to sex the crania.

Our data respecting the living animals supply the information that the lower jaws of the males protrude at least an inch and a half beyond the upper maxillæ. This accounts for fifty per cent. of the excess of ramal length, and explains the reason for the male and female crania being similar in most of their measurements, and yet showing so sharp a contrast in the matter of their mandibles. Our photo will make this partly evident, as the rod is sloped to touch both jaws. The following notes upon the skeletons of the adult sexes will aid the student in the determination of fragmentary elements and even single bones.

COMPARATIVE CERVICAL VERTEBRÆ.

Measurement Made.	Male. in.	Female. in.
Width across the processes of the axis	6¾	6¼
Total length of cervical series	3½	3¼
Width across centrum of cervical No. 7	2¾	2
Vertical measurement of same	2⅝	1¾

DORSAL VERTEBRÆ.

Measurement Made.	Male. in.	Female. in.
Greatest height of dorsal No. 6 along angle subtended by the spine	5⅜	5⅛
Across diapophyses of same	5½	4⅜

LUMBAR VERTEBRÆ.

Measurement Made.	Male. in.	Female. in.
Total length of lumbars, 6, 7, 8, 9, 10, 11, 12, 13, 14	15⅛	12¼
Greatest width across diapophyses	12⅛	9¼
Greatest height of neural spine	6⅞	5¼
Greatest length of body of vertebra	1¾	1¼

SCAPULÆ.

Measurement Made.	Male. in.	Female. in.
Greatest scapular height	7½	6½
Greatest scapular width	12	8⅞

ARM BONES.

Measurement Made.	Male. in.	Female. in.
Length of humerus	3¾	3¼
Length of radius	4¼	4¼
Length of ulna (including the olecranon process)	3½	3½
Width of radius and ulna (distal)	3⅞	3½

Vertebral formula. Cervicals 7, the first two fused to extinction in all skeletons handled by us. Dorsals 13. Lumbars 17. Candals 28. Total 65. Ribs 13 pairs, five of which reach the sternum, which latter is always in a single piece.

HISTORY.

The two whales chiefly noted in this paper, both came into the Tamar River (the male some years prior to the female), and were thus captured; both were in ill-health. The male had just escaped from some titanic battle, and was torn and mutilated. The female ascended the North Esk to Hobblers' Bridge, and died there, but the male still showed fight, and was killed in the Cataract Gorge, and afterwards exhibited in Brisbane-street.

Both were similar in external outlines, and also in colour. In the matter of the lower jaws, the mandibular symphysis protruded more in the male than in the female.

The upper parts of these Dolphins were deep black, richly polished, with slate-coloured tints below. We hold skulls and parts of skeletons from King Island, Flinders, and the North-West Coast of Tasmania, and there is some evidence in favour of admitting a second species of *Tursiops*, but for the present we regard *Tursiops tursio* as being alone certain. If a second species is shown to exist, we think a curious twisting of the neural spines of the lumbar vertebræ and the moderate length of some eight feet odd, will largely enter into its specific characters. Twice we have traced such items, but we are still awaiting the evidence obtainable from the dissection of a complete specimen.

In conclusion, we may just point out that as far as our evidence goes the *Tursiops* of Australian seas very closely simulates that of European waters, and, upon the whole, justifies the retention of a single classification for both parts of the globe. It might be wise, however, to retain for our Dolphins the additional distinctive title—"Southern Form"— as we suggested in the early part of our paper.

NOTES AND ADDITIONS TO THE FUNGUS FLORA OF TASMANIA.

By L. Rodway, C.M.G.
Government Botanist.

Plate XXVI.

(Received 25th August, 1919. Read 1st September, 1919.)

Of the Agarics which may be gathered in Tasmania we have but a poor record. The reason is not far to seek; they are incapable of satisfactory preservation. The softness of their structure causes such a distortion in drying that means of critical comparison are lost. Certainly they may be preserved in spirits or formaline, but then the colour will go, and colour in this group of plants is of first importance. The only satisfactory way to proceed is to make a faithful water-colour copy, also accurate notes of all features, and trust that some expert may recognise and name them.

The following four species may certainly be added:—

Collybia protracta, Fr. Solitary, dark brown, almost black. Pileus to 5 cm., convex to plane, umbonate, smooth; gills deep, dark gray often with a lighter edge; stem long, slender, solid fibrous. Spores smooth, hyaline 9 x 6 μ. Distinguished by its black colour, and very broad, crowded gills.

Found occasionally in partially shaded places.

Collybia butyracea, Bull. Pileus convex to plane, smooth, rather hygrophanous, mostly 5-10 cm., watery flesh coloured, browner when old; gills very numerous, delicate, white, receding with a decurrent tooth; stem cartilaginous, stuffed usually expanding at the base. Spores hyaline, smooth, 6 x 3 μ.

Common, chiefly amongst wattle trees.

Flammula prasina, C. et M. Pileus convex. subumbonate, mostly 5 cm., dull green in centre fading to dull yellow towards the margin; gills fairly numerous dull yellow, receding with a decurrent tooth; stem bold, 5-10 cm., pale yellow, solid, pithy in middle. Spores brown, smooth, 8 x 4 μ.

Common in forests.

Pholiota adiposa, Fr. Pileus convex, 5-10 cm., glutinous, yellow with darker squarrose scales; gills broad yellow then ferruginous, adnate slightly rounded; stem long, often bulbous, yellow, surface floccose, ringed.

Very common on dead wood.

Of other Hymenomycetous Fungi not hitherto recorded as Tasmanian:—

Hydnum cyathiforme, Sch. With a central stem, squamous, very like a Thelephora, dark gray to white; spines short, white, crowded. Spores hyaline, globose, 3 μ.

Radulum molare, Fr. Resupinate, waxy developed into irregular blunt tubercles; dull yellowish.

On dead wood.

Phlebia reflexa, Berk. Resupinate, upper margin reflexed. purplish brown, waxy, raised into irregular obtuse wrinkles more or less radiating.

On dead wood.

Boletus badius, Linn. A large coarse Bolet which only appears under introduced Pine trees. Surface brown, tubes yellow, becoming greenish blue when bruised.

Merulius aureus, Fr. Very thin and closely adhering, golden yellow, margin mycelioid, paler.

On dead wood.

Hymenochæte purpurea, C. et Mor. Distinguished from the other members of the genus found in Tasmania by its purple colour.

On dead wood.

Clavaria rosea, Fr. Solitary or in small tufts, up to 2 cm., obtuse, rosy, slender below, spores globose, 3 μ.

On the ground.

Hydnangium australiense often has the sterile base carried through the gleba to the apex, assuming the appearance of an obsolete stem. When this is so the pileus is generally open below, exposing the gleba, giving the plant all the characters of a *Secotium*.

Hydnangium microsporium, n.s. Globose, 6 mm. diameter, white to pale ochre. Peridium rather thick and tough. Gleba dense, orange, cavities small, packed with spores. Spores hyaline, globose, armed with short spines or warts, 5-6 μ. diameter.

Mt. Nelson Range.

Apparently near *Hydnangium Brisbanensis*, differing mainly in colour and density of gleba.

Hydnangium densum, n.s. Globose, pale ochre, 1 cm. diameter. Peridium very thick and tough. Gleba marbled with black from the small spore cavities which are about 0.3 mm. diameter and densely packed with spores. Spores globose, brown, minutely echinulate, 9 μ.

Mt. Nelson Range.

A very curious species. In section the thick peridium and black spore cavities and general dense structure differ from other members of the genus.

Hydnangium alveolatum, C. et M. Subglobose, pale ochre, 5-10 cm. diameter. Peridium thin fleshy, gleba dense, cells pale ochre numerous, about 0-2 mm. diameter, dense; spores globose, minutely alveolate, 10-12 μ. diameter.

Valley at foot of Mt. Wellington.

Hysterangium atratum, n.s Subglobose, 1.5-2 cm. diameter, dark brown, viscid. Peridium fleshy, tough, thin; gleba dark brown, canals small but very numerous. Spores dark brown, nearly globose 12 x 11 μ., minutely alveolate.

Very like *H. neglectum*, but with very different spores.

Mt. Nelson Range.

Hysterangium obtusum, n.s. Irregularly globose 2 cm., violet when fresh. Peridium thick violet not easily separating from the gleba. Gleba pale slatey olive. Spores oblong, very obtuse, smooth, hyaline, 9 x 4 μ.

Differing from the *H. affine* in peridium and spores.

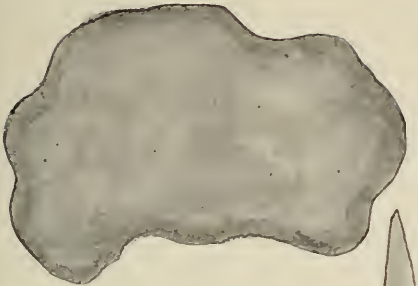
Mt. Nelson Range.

Hymenogaster fulvus is described in P. et P. R.S. Tas., 1917, p. 109, as being black. It becomes so when old, but is pale gray when young.

Secotium ochraceum, n.s. Underground subglobose, 1-2 cm. diameter. Pale ochre-brown, surface verrucose, peridium very thin, hardly apparent; stem short, extending to the upper surface, but not produced laterally on the pileus. Gleba ochraceous, canals bold tortuous, dissepiments thin. Spores elliptic, subacute at both ends, pale-brown, smooth, 16 x 8 μ.

Very like forms of *S. gunnii*, but spores twice as long.

Cascades, Hobart.



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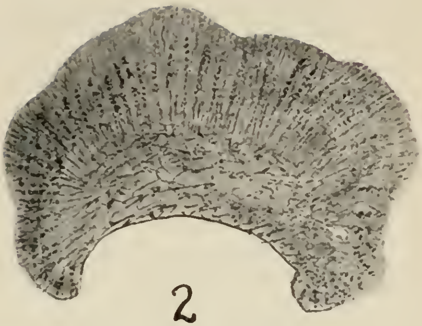

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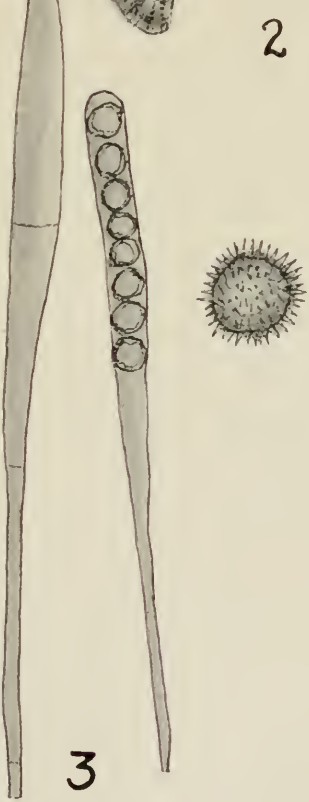

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SPRAGUEOLA MUCIDA, n.s.

Crucibulum simile, Mass. Usually many together, 5-10 mm. high, mouth expanding becoming revolute; externally tomentose. Spores colourless, subglobose, 4 x 3 μ.

Tremella vinosa, Mass. This plant was described in the Kew Bulletin in October, 1899, from specimens gathered in Tasmania, but does not appear to have been recorded locally. The following is Massee's description : —

> Gelatinous, soft, gyroso-plicate, glabrous, vinous, 1-2 cm. broad. Basidia globose, sterigmata 4. Spores subglobose, hyaline, smooth 10 μ.
>
> Allied to *T. corrugata, Sch.*

On dead wood. Distinguished from all other Tasmanian Tremellas by the dark vinous colour.

Puccinia obtegens, Tul., also known as *Puccinia suaveolens, Rostr.* This is a rust fungus, which appears to be parasitic only on the California Thistle. It has recently appeared in Tasmania, and is showing much activity. Plants attacked by it become sickly, and do not flower. It may have, in the future, considerable value as a means of controlling the weed.

Amongst *Ascomycetes* the following may be recorded : —

Chlorosplenium æruginosum, Tul. Like other members of the genus it is of dark blue-green colour, and extends this colour to the wood on which it grows. The cups are thin, and often irregular in shape. It differs from our commoner *Chlor. omniverens*, by the spores being shorter and narrower, being 12-14 x 3-4 μ.

Trichopeziza sphærula, Sacc. A minute yellow peziza, hairy on the external surface, growing on the bark of She and Bulloak.

Ciboria firma, Pers. In the description of the genus, the sporophore is stated to be borne on a long stem. Though the long-stemmed form is common in Tasmania, it is sometimes met with a stem so short as to approximate with the genus *Helotium.*

Helotium nigripes, Pers., is referred to in Cooke as the stem turning blackish, and the spores 5 x 1-5 μ. long. A very common form, which is usually considered to be typical, has the whole external surface more or less black, and the spores 11 x 3 μ.

Humaria bovina, Sacc. Concave to plane wavy, soft-fleshy, umber, with a dull greenish tint, smooth 5-10 mm. Spores oblong smooth 19-22 x 9-11 μ.

On cowdung, together with *Lachnea stercorea*, *Ascobolos furfuraceus*, etc.

Dasyscypha eucalypti, Berk., is much more variable than indicated in Cooke's Handbook. It grows on all sorts of dead twigs and leaves, sometimes attains 4 mm. diameter, the disk is livid when fresh, deep orange when dry. Spores 16-24 x 4.5-8 μ.

Orbilia crystalina, n.s. Globose, waxy, gregarious, orange, 1-2 mm. diameter, surface crystalline, with large, prominent, pellucid cells. Hymenium at first covered with a crystalline membrane; as the hymenium expands the membrane bursts in the middle, and remains as a toothed margin; hymenium expands till it is broad, flat, to convex. Asci cylindric-clavate 9 μ. diameter. Paraphyses few, filiform, yellow, 2.3 μ. Spores uniseriate, hyaline, smooth, elliptic with acute ends, 18 x 7 μ. The broad spores readily distinguish it.

Cascade estate, Hobart.

Spragueola mucida, n.s. Ascophore sessile, subglobose, vaguely nodulose, about 5 mm. diameter, subterranean, growing on buried wood, white. Hymenium covering the entire surface. Asci cylindric. Spores 8, globose, coarsely echinulate, 18 μ. diameter, uniseriate, paraphyses greatly exceeding the asci, filiform attenuate at apex, immersed in dense jelly. At maturity the jelly increases to 1-2 cm., carrying paraphyses and asci with it.

Underground. Mt. Nelson Range.

The genus is founded upon one rare American species—"only two specimens are known; these are in "the Kew Herbarium" (Massee). Our plant differs from the type in having globose instead of elliptical spores and the development of jelly is unique. The sessile habit of the genus is not common amongst *Geoglosseæ*, but the reduction of hypothecium and total absence of excipulum indicates its relation. The round spores suggest *Neolecta*, but habit and copious paraphyses are against it.

Cenangium furfuraceum, De Not. Cæspitose and erumpent from a common base, everywhere black. Ascophores about 5 mm. high and broad, cupshaped but much distorted from mutual pressure, tough, externally rough. Asci clavate, spores hyaline, spindle shaped with obtuse ends, slightly curved, 12 x 2 μ

On dead eucalypt.

The hymenium in the typical European form is described as cinnamon, while ours is at least very dark brown, but otherwise there appears no distinction.

Paurocotylis niveus, n.s. In the definition of the genus, Berkeley gives no description of the spore formation, but under *P. pila* he refers to the spores being formed on pellucid peduncles. In the Tasmanian plant the spores are born singly in globose asci.

Subterranean or emerging, globose, pure white mostly 3-6 mm. diameter; dense and tough, canals very irregular. Asci globose 30-50 μ., numerous, entirely filling the canals, each on a long slender peduncle, and containing a single globose strongly echinulate spore 16 μ. diameter, epispore very thick.

On the ground Cascade estate, Hobart.

Sphaerosoma tasmanica, n.s. Subterranean, then partially emerging, globose-convolute, ochre to nearly white 1 cm. diameter, fleshy-cartilaginous, hollow, closed or opening on one side towards the base; hymenium covering the internal surface, wall 1.5 mm. thick. Asci linear, spores 8 uniseriate, elliptic, obtuse, coarsely echinulate 24 x 16 μ. Paraphyses filiform, with a globose tip.

Cascade estate, Hobart.

Very like *Hydnocystis cyclospora*, only very different spores, and not opening above.

Aulographum eucalypti, C. et M. Linear black apothecia, many on livid spots.

On leaves of *Euc. obliqua*, and other Eucalypts.

Microthyrium amygdalinum, C. et M. A shield shaped flat perithecium, superficial.

On the surface of leaves of *Euc. amygdalina* and others.

Erysiphe polygoni, D.C., also known as *Erysiphe communis, Grev.*, is a mildew that is making its presence felt amongst garden flowers, especially Sweet Peas.

Hypocrea sulfurea, Schw. C. G. Lloyd writes that our plant, commonly referred to *H. citrina, Pers.*, is erroneously determined; should be as above.

Cordyceps gracilis, Grev. A specimen of this has recently been gathered on Mt. Nelson Range. Two clubs emerged from a larva; stipes pale, about 1 cm., head oblong, yellow, about 4 mm. long.

Mr. Olliff, once Government Entomologist of New South Wales, renamed this as *C. scottianus*, but there was no apparent justification. As he also named a form of *C. robertsii* as new, under the name of *C. selkirkii*, and another as *C. coxii*, and further resuscitated a plate of *C. taylori, Berk.*, which had appeared in Hooker's Journ. Bot. N.S., Vol. II., 1843, and made it the type of a new species, under the name *C. trictenæ*, his suggested new species have not been generally accepted.

Cordyceps robertsii, Hook. The well known Vegetable Caterpillar of New Zealand has been recently gathered in a gully at the foot of Mt. Wellington. It is easy to overlook this, and probably diligent search will bring more to light.

Cystopus tragopogonis, Schr. Occurs on many different Composites, but is particularly abundant on the leaves of *Lagenophora emphysopus*, forming conspicuous white patches.

Amongst the Incompletæ, the following interesting forms may be recorded:—

Dendrodochium molle, n.s. Subglobose from a broad base, 2-4 mm. diam., soft waxy-gelatinous, dull white. Conidiophores verticillate, conidia single, terminating long slender branches, 5 x 4 μ.

Common on dead wood, collapsing when dry into a flat scale.

Verticillium lateritium, Berk., forming broadly effused velvety orange-red or vermilion coloured patches. Sporophores erect, verticillately branched, conidia elliptic, red, 4-6 x 3 μ.

Common on dead vegetable substances.

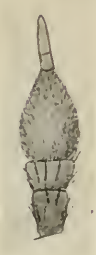
Stilbum erythrocepnalum, Ditm. Stem thick, tomentose, whitish, terminating in a turbinato-globose. rosy or deep red head; conidia elliptical, 4-6 x 2-2.3, hyaline, borne on slender septate, colourless conidiophores that are nodulose at the apex, 50-60 x 3-3.5 μ. (Massee).

On rabbit's dung.

EXPLANATION OF PLATE XXVI.

SPRAGUEOLA MUCIDA, n.s.

1. Tuber x 10. 2. Section. 3. Ascus and Paraphysis, Spore.



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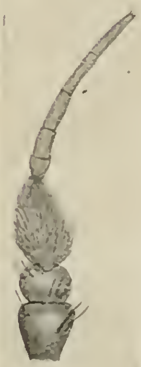

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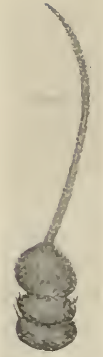

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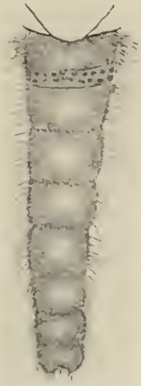

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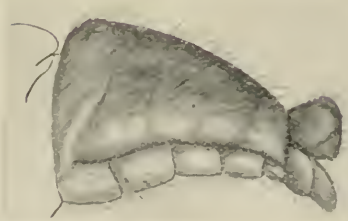

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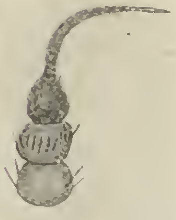

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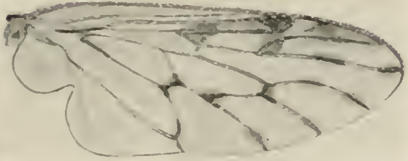

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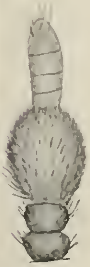

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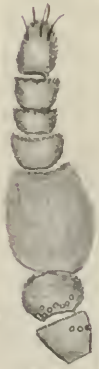

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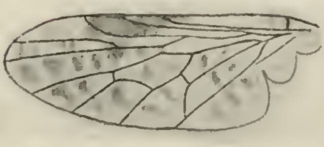

10

AUSTRALIAN *RHYPHIDÆ AND LEPTIDÆ (DIPTERA).*

By G. H. Hardy.

Plate XXVII.

(Received 24th June, 1919. Read 1st September, 1919.)

Owing to the discovery that the well known *Rhyphus brevis*, Walker, is a synonym of Macquart's *R. dubius*, which was misplaced by the latter author with doubt in the genus *Chrysopilus* (*Leptidæ*), and as Walker's name is now generally used in literature, it is necessary that an early notification of this change of name be published.

This opportunity is taken to revise the *Rhyphidæ*, which family contains but one known species in Australia.

Fam. RHYPHIDÆ

This family may be described as follows:—Slender insects with filiform antennæ containing 16 joints, the two basal differentiated, the flagellum (3-16) tapering apically; with two basal and a discoidal cell complete, anal cell widely open, all veins simple, not forked; five posterior veins; macrotrichia (at least in the Australian species) on the membrane of the wing. Abdomen with 7 segments.

The following is rendered from Kertesz' key in Term. Fuz. xxv., page 4, 1902:—

Key to the Genera of Rhyphidæ.

1. Radial vein curved, marginal cell open on border. *Rhyphus.*
   Radial vein straight, closing marginal cell by meeting the subcosta at costa. 2.
2. Radial vein rising from cubital anterior to the transverse cross-vein, almost opposite the base of the discoidal cell. Eyes bare. *Olbiogaster.*
   Radial vein rising from the cubital at the transverse cross vein. Eyes hairy. *Lobiogaster.*

Genus *Rhyphus*, Latr., has a wide distribution, occurring in Europe, Africa, India, Java, Australia, New Zealand, and America (North and South); genus *Olbiogaster*, Ost-Sack., is only known from the Southern parts of North America; and genus *Lobiogaster*, Phil., occurs in Chili.

Genus Rhyphus, Latreille.

Latr. Hist. Nat. Crust. et Ins. xiv. 291., 1804.

Kertesz. Cat. Dipt. Vol. 1., pg. 304, 1902 (which see for synonymy).

Characters as described under the family; radial vein curved, eyes in ♀ separate, in ♂ contiguous, bare. Abdomen cylindrical, elongate tapering. Legs simple, slender, spines at most only indicated by strong hairs on the posterior tibiæ; anterior tibiæ with one, intermediate and posterior tibiæ with two apical spurs.

Rhyphus dubius, Macq.

Chrysopilus dubius, Macq., Dipt. Exot. suppl. 4, pg 104, tab. 9, fig. 18, 1850.

Rhyphus brevis, Walk., Ins. Saund. Dipt. i., pg. 449, 1856.

Macquart's so called *Chrysopilus dubius* is a *Rhyphid*. The description from a mutilated specimen and the figure of the wing show conspicuous evidence that this is the case, since the wing markings and the wide anal cell agree with those of the common Rhyphid known as *R. brevis*. The figure shows the cubital vein forked, but the description would lead one to suppose otherwise, as only one submarginal cell is mentioned; indeed, such discrepancies are not unusual in Macquart's work. The type specimen is from East Australia, and Walker's type is Tasmanian; a comparison of Sydney and Tasmanian specimens shows them to be identical.

Easily recognised by its brownish colour, wings much spotted and macrotrichia on the membrane of the wing as well as on the veins. Dr. Tillyard records these macrotrichia in P.L.S. N.S.W. xliii., pp. 627-641, text figures and plate, 1918.

Yellowish brown. Eyes bare, black; ocellar tubercle black; flagellum of antennæ black. Thorax with three broad black stripes, the central stripe reaching neck. Abdomen more or less stained black. Thorax and scutellum have bristles, or hair-like bristles which are not always easy to differentiate. The following, according to their position and size, are undoubtedly bristles:—2 dorsoscutellar, 4 notoplural, 1 supra-alar, 2 interalar; dorsocentral and acrostichal bristles indicated by conspicuous bristles posteriorly which become more hair-like anteriorly, and other anterior hair-like bristles can be traced on the thorax. Wings hyaline, slightly fuscous at base, fuscous spots at humeral and median cross veins, and distinctly irregular fuscous bands (very spot like) from costa;

one band through base of discoidal cell to the tip of the 5th posterior vein; a second from stigma through tip of discoidal to apex of 4th posterior; a third half way between this to the tip of the wing, reaching into the 3rd posterior cell; and finally the wing is bordered fuscous from the apex to the anal vein. The sexes are very similar, the eyes contiguous in ♂, and widely separate in ♀. In respect of the former the abdomen is much more slender and cylindrical.

Length ♂ 5-6 mm., ♀ 4-7 mm.

Hab. Tasmania, Hobart, September to November; New South Wales, Sydney, June; Western Australia, Perth.

The specimen utilised for the above description is in the Australian Museum, and was captured at Neutral Bay, Sydney, on the 7th June, 1917. (Collector.—A Musgrave.)

The species is abundant during part of the year, and will probably be found to have a wide distribution in Australia.

Fam. LEPTIDÆ.

The known Australian genera may be characterised as follows:—

Thorax, scutellum, and abdomen without bristles, the bristles of the legs if present are either thin or small. Abdomen either elongate and tapering, or conical. Anal cell closed, or at most narrowly open at border; cubital vein forked; 4 or 5 posterior veins, all reaching margin except in genus *Spaniopsis*, where the third posterior vein is stunted if present. Antennæ three jointed at least, the third joint bearing an appendage of apical joints in the form of an arista thickened and composed of more than one joint, thickened basally and unjointed, or hairlike. Tibiæ with or without apical spurs.

Metoponia rubriceps, Macq., belongs to the *Stratiomyiidæ*.

Chrysopilus dubius, Macq., belongs to, and is treated in, the *Rhyphidæ* above.

The following key will separate the known Australian Genera:—

Key to the Genera of Australian Leptidæ.

1	Five posterior cells	2.
	Four posterior cells	5.
2	Fourth posterior cell closed	*Clesthenia.*
	Fourth posterior cell open	3.

3. Antennæ with unjointed arista, eyes touching in ♂ widely separate in ♀. 4.
   Antennæ with arista jointed and thickened, eyes separate in both sexes. *Atherimorpha.*
4. Eyes bare, abdomen elongate, anterior tibiæ without spurs, intermediate with two, and posterior with one spur. *Chrysopilus.*
   Eyes pubescent, abdomen conical, short, anterior tibiæ with one, intermediate and posterior tibiæ with two spurs. *Dasyomma.*
5. Wings hyaline, indications of the third posterior vein usually present, fourth posterior vein rising from the discal cell about $\frac{1}{4}$ length from base. Blood-sucking. *Spaniopsis.*
   Wings spotted, 3rd posterior vein rising from $\frac{3}{4}$ length of discal cell, no trace of the fourth posterior vein present. Non blood-sucking. *Austroleptis.*

Genus Clesthenia, White.

White, P. & P. Roy. Soc. Tasm., pg. 45, text fig. 3 (wing) 1914.

This genus is characterised by:—Five posterior cells, fourth and anal cell closed: antennæ three jointed with a short thickened two jointed (apparently) terminal style: legs with all tibiæ two spurred; thorax arched, and abdomen conical. Eyes bare, separate in both sexes, short bristles on intermediate and posterior tibiæ.

Clesthenia aberrans, White.

(Pl XXVII., fig 1.)

White, P. & P. Roy. Soc. Tasm., pg. 46, text fig. 3, 1914.

Hab. Tasmania; Hobart, Mangalore, Mt. Wellington, Dunalley.

Type in the British Museum.

Genus Atherimorpha, White.

White, P. & P. Roy. Soc. Tasm., pg. 41, text fig. 1, 1914.

Five posterior cells open, anal cell narrowly open or closed; antennæ three jointed with a jointed thickened style, anterior tibiæ without spurs, intermediate and posterior tibiæ with two spurs, abdomen elongate tapering, eyes separate in both sexes, bare; tibiæ with conspicuous bristles.

Atherimorpha vernalis, White

(Pl. XXVII., fig. 2).

White, P. & P. Roy. Soc. Tasm., pg. 42, text fig. 1, 1914.

Hab. Tasmania; Geeveston, Mt. Wellington, Hobart, Sandford, Bagdad, Cradle Mt. White states that a near ally occurs in New South Wales. Victoria; Ringwood 19th Oct., 1918, one ♂ specimen (C. E. Cole).

At Cradle Mt. a yellow brown variety was taken as well as the ordinary form.

Type in the British Museum.

Atherix pusilla, Macq.

Macquart, Dipt. Exot. suppl. 5, pg. 88, pl. 2, fig. 13, 1854.

The description and the figure of the wing of this species are nearest to *Chrysopilus æqualis*, Walker, but it is inconceivable that Macquart would place a species of the genus *Chrysopilus* into the genus *Atherix*. Possibly the species belongs to the genus *Atherimorpha*.

Macquart's description is short, and as follows:—
"Length 2 lines. ♀. Black (denuded), with traces of
"white pubescence. Legs black, tibiæ fawn. Wings grey;
"stigma brown. Adelaide.

Genus CHRYSOPILUS, Macq.

Chrysopilus, Macq., Recueil Soc. Sci. Agric. Lille, pg. 403, 1826.

Kertesz, Cat. Dipt. Vol. 3. pg. 317. 1908 (which see for synonymy).

White, P. & P. Roy. Soc. Tasm., pg. 39, 1914.

Five posterior cells open, anal closed; antennæ three jointed with a hair-like terminal arista; anterior tibiæ without spurs, intermediate with two, posterior with one spur; abdomen slender; eyes contiguous in ♂, separate in ♀, without pubescence; tibiæ without bristles.

Chrysopilus æqualis, Walk.

(Plate XXVII., figs. 3, 4.)

Leptis æqualis, Walker, List. Dipt. B.M. i., pg. 216, 1848.

? Froggatt, Austr. Ins., pg. 296, 1907.

Chrysopilus æqualis, Kertesz, Cat. Dipt. iii., pg. 317, 1908.

Chrysopila rufipes, Macquart, Dipt. Exot. suppl. 4, pg. 103, pl. 9, fig. 17, 1849.

Chrysopilus rufipes, White, P. and P. Roy. Soc. Tasm., pg. 40, 1914.

Chrysopilus antipodes, Bigot, Soc. Zool. France, xii., pg. 105, 1887.

Chrysopilus tasmaniensis, White, P. and P. Roy. Soc. Tasm., pg. 40, 1914.

Specimens of *Chrysopilus* are represented in most of the collections examined by me, and they invariably belong to this variable species, two forms of which White separated on colour and habits in Tasmania.

An extreme form is common at Trevallyn, Launceston, which has an extra wide head, and the wings are suffused with black anteriorly from the base and reach to two thirds of the length of the costa. Mr. C. E. Cole took a specimen approaching this form at Eltham, Victoria.

Macquart's species from Tasmania was evidently correctly identified by White, and Bigot's species is probably identical. White's type of *C. tasmaniensis* only differs in the colour of the legs and probably this is the form described by Walker from Australia as *Leptis æqualis*.

A long series of specimens shows these forms merging into each other and therefore they cannot be considered distinct species.

Hab.—Tasmania: Mt. Wellington, Hobart, Bagdad Valley, Eaglehawk Neck, Mt. Maria, Launceston, Cradle Mt. It has a wide distribution throughout Tasmania and occurs from October to April.

Victoria: One specimen, Eltham, 26th October, 1918. (Collector.—C. E. Cole.)

New South Wales: One specimen from behind Sublime Point, Thirroul, 30th March, 1918. Also a number in the Macleay Museum.

The type of *C. tasmaniensis*, White, is in the British Museum.

Chrysopilus auratus, Fabr.

Atherix auratus, Fabr., Syst. Ant., pg. 73, 1805.

Chrysopilus auratus, Kertesz. Cat. Dipt. iii., pg. 318, 1908 (which see for further references).

Rhagio atrata, Meig., Klass. Ins. 302, 1805.

Chrysopila atrata, Macq., Dipt. Exot., suppl. 2., pg. 50, 1847; Walk., Ins. Saund. Dipt. i., pg. 164, 1852.

This species is European, and the Australian records are evidently incorrect. Neither Macquart nor Walker gave any definite descriptions, and it is impossible to determine what species they actually had before them.

Genus DASYOMMA, Macq.

Macq., Dipt. Exot. 2. i., pg. 31, 1840.

Five posterior cells open, anal cell narrowly open; antennæ three jointed with a terminal unjointed arista which is slightly thickened basally; tibiæ without bristles, anterior with one, intermediate and posterior with two apical spurs; abdomen conical; eyes pubescent, contiguous in the ♂, widely separated in the ♀.

Hitherto this genus was only known from Chili. Macquart separated it from *Leptis* by the pubescent eyes. This record of Australian allies to the Chilian species is of special interest, parallel to that of genus *Pelecorhynchus* (*Tabanidæ*).

Key to Genus Dasyomma.

1. Wings spotted, eyes thickly pubescent. *maculipennis.*
   Wings suffused with black, not spotted, eyes scantily pubescent. 2.
2. Antennæ reddish, abdomen entirely black. *dissimilis.*
   Antennæ black, abdomen brown, with apex of segments black. *dissimilis var.*

Dasyomma maculipennis, sp. nov.

Eyes thickly pubescent; wings suffused with brown, with dark spots.

♂. Shining black, face with tracings of greyish or brownish grey tomentum, eyes contiguous, thickly pubescent; antennæ with black hair on the two basal segments, beard yellowish grey, with a little black anteriorly nearest antennæ. Thorax with two grey tomentose median stripes and obscurely grey laterally, but these markings may be entirely obsolete; hairs yellowish mixed with a little weak black hair, similar hairs on scutellum and abdomen. Femora black, anterior and median with longish white hairs below; tibiæ reddish black, apically stained black; tarsi reddish, all joints apically black; wings dark, very brownish basally and along costa to tip of the radial vein, dark spots at the apex of the two basal and discoidal cells and also at base of the cubital fork.

♀. Similar but lighter in the thorax; head yellowish brown with the thickly pubescent eyes widely separated; third joint of antennæ, ocellar tubercle, and a moderately large frontal tubercle black; legs yellowish, all apices of joints stained black.

Varieties:—The above descriptions are taken from the ♂ holotype and ♀ allotype; the paratypes vary to a considerable degree in colour and markings; any part may be more brownish than black, and in the ♀ the abdomen is sometimes brown with apical margins of segments black, and the thorax may appear brown with three black stripes, the centre being sometimes obscure, or the lateral ones interrupted.

Length, 5-6 mm.

Holotype and allotype in the Australian Museum.

Hab. Tasmania:—Cradle Mt., 9 ♂, 2 ♀, 11th to 21st Jan., 1917; Launceston, 2 ♀; 28th Oct., 1916, and 7th Jan., 1917.

Dasyomma dissimilis, sp. nov.

(Pl. XXVII., figs. 5, 6.)

Very similar to *D. maculipennis*, but easily distinguished by the apparently bare eyes, which, however, are found to be scantily pubescent when seen under a low power microscope; the wings without spots, suffused with brown.

♂. Thorax and abdomen shining black, head covered with brownish grey tomentum, the first two joints of the antennæ reddish. palpi brownish black with black hairs; proboscis and third joint of antennæ black; hairs on thorax, scutellum and abdomen black; femora shining black or brown, tibiæ and tarsi brownish with black apices, the legs are, however, variable in colour.

Length, 6 mm.

♂ var. This variety, which may possibly represent a distinct species, has the abdomen brown, with apices of segments black; the legs much darker, and the antennæ entirely black; the general appearance of the insect is distinct, but there seem to be no characters other than colour and size between it and the typical form.

Length, 5 mm.

♀. Evidently belongs to the above variety, and is similar in colouration to the brownish form of *D. maculipennis*. The frontal and ocellar spots are united, the thorax stripes are obscured with blackish, and nearly all hairs black. It also differs by having only scanty pubescence on the eyes.

Brown; ocelli, frontal tubercle, third joint of antennæ, three obscure stripes on thorax, apices of joints of legs, apical borders of abdominal segments, hair of thorax, abdomen, antennæ, palpi, a little on other parts of head and legs, black.

Length, 5 mm.

Holotype, allotype, and the holotype var. in the Australian Museum.

Hab. Tasmania:—Cradle Mt., holotype 16th Jan., 1917; holotype var. and allotype 16th Jan., 1917; paratype, 16th Jan., 1917; paratype var. 21st Jan., 1917. Mt. Wellington, paratype, 6th Jan., 1916. In all 6 specimens.

Genus Spaniopsis, White.

White, P. & P., Roy. Soc. Tasm., pg. 43, text fig. 2, 1914.
Ferguson, J. & P., Roy. Soc. N.S.W., vol. 49, pg. 233, plate 26, 1915.

Antennæ with the first and second joints small, the third large, terminally produced into a thickened jointed appendage. Wings with only four posterior cells, the third posterior vein being reduced to a stump which is occasionally absent; the fourth posterior branches from about one quarter the length of the discoidal cell; the lower branch of the cubital fork ends at the tip of the wing; anal cell closed before the border of the wing; eyes bare, in the female separate (♂ unknown); abdomen conical; tibiæ without bristles, the anterior and posterior without spurs, the intermediate with two spurs.

The female has blood-sucking habits.

Dr. Ferguson has given a key to the identification of the species founded on colour which is very reliable and easy for use. The following key is founded on structure.—

Key to Genus Spaniopsis.

1. Terminal appendage of antennæ twice the length of the three basal joints. *longicornis.*
   Terminal appendage of antennæ about as long as the three basal joints. 2.

2. The third joint of antennæ swelling away from its terminal appendage towards the base much more dorsally than ventrally. 3.
   The third joint of antennæ swelling from its terminal appendage more or less uniformly above and below. 4.

3. Terminal appendage of antennæ a little longer than the length of the three basal joints. *marginipennis.*
   Terminal appendage of antennæ a little shorter than the length of the three basal joints. *clelandi.*

4. A small species from N.S.W., 3 mm. long. *vexans.*
A larger species 5 mm. long from Tasmania. *tabaniformis.*

Spaniopsis tabaniformis, White.

White, P. & P. Roy. Soc. Tasm., pg. 44, text fig. 2, 1914.
Ferguson, J. & P. Roy. Soc. N.S.W., xlix., pg. 238, Pl. 26, fig. 11, 1915.

Hab. Tasmania. The only specimen taken, since the original 13 from Freycinet's Peninsula in 1914, was captured by Mr. C. Cole at Wedge Bay, during Easter, 1917.

Spaniopsis vexans, Ferg.

Ferguson, J. & P. Roy. Soc. N.S.W. xlix., pg. 238, pl. 26, figs. 6 and 10, 1915.

Hab. New South Wales:—Heathcote, June, 1917, and Thirroul (Sublime Point), 30th March, 1918. 2 specimens.

Spaniopsis clelandi, Ferg.

Ferguson, J. & P. Roy. Soc. N.S.W., xlix., pg. 240, pl. 26, figs. 5 and 9, 1915.

Hab. New South Wales:—2 specimens, Thirroul (Sublime Point), 30th and 31st March, 1918.

Spaniopsis marginipennis, Ferg.

Ferguson, J. & P. Roy. Sec. N.S.W., xlix., pg. 239, pl. 26, figs. 2, 4, and 8, 1915.

Hab. New South Wales:—Heathcote, June, 1917, about 40 specimens, very common at the bottom of a gully; Hornsby, June, 1917.

Spaniopsis longicornis, Ferg.

Ferguson, J. & P. Roy. Soc. N.S.W., xlix., pg. 242, pl. 26, figs 1, 3, and 7, 1915.

Hab. New South Wales:—Heathcote, June, 1917, 3 specimens.

Genus AUSTROLEPTIS, gen. nov.

Antennæ 7 jointed, composed of two more or less equal basal joints, both about as wide as long, third swollen and much compressed, and a terminal complex of four closely fitting but distinct joints, which under a coddington lens often looks like only three. The venation is somewhat similar to *Spaniopsis* in appearance, but entirely different structurally; there are only four posterior cells, the third posterior vein (coincident with the fourth) branches from beyond half the length of the discal cell; the lower branch of the cubital fork runs to or above the tip of the wing; anal cell closed by the true fifth (apparent fourth) posterior vein a little before the border of the wing; the transverse vein situated about one third the length of the discal cell. The wings much marked with spots. Tibiæ without conspicuous bristles, at most with a few weak ones on the anterior legs; intermediate and hind tibiæ with two apical spurs, which can only be seen with difficulty under a lens; abdomen conical; eyes bare, contiguous in the ♂, separate in ♀.

Type of the genus.—*A. rhyphoides*, sp. nov. . . . . Tasmania.

Austroleptis rhyphoides, sp. nov.

(Pl XXVII., figs 7, 8, 9.)

♂. Black; head with scanty hairs, palpi with black hairs, eyes smooth, ocelli on a raised tubercle, with black hairs, back of head with few black hairs and thin bristles; thorax with long black hairs, and with scanty traces of brownish grey tomentum, scutellum with long black hairs; base and apex of femora, tibiæ, and base of tarsi yellowish; abdomen with base of segments black, apically yellowish brown; long bristly black lateral hairs; underside similar; wings hyaline, basal half more or less yellowish, a black spot on fork of radial and subcostal veins, another at stigma, reaching the base of the cubital fork, a small spot at apex of lower branch of cubital vein; two spots along the first posterior vein situated at middle and sub-apex, two spots on second and third posterior veins situated at base and sub-apex; a spot at discal cross vein, and another on the fifth posterior vein where it runs into the anal vein. There are other, but indefinite, indications of black on the wings.

♀ Yellowish brown; head brown, proboscis black, apex of antennæ black, front blackish centrally extending to two black spots near eyes; thorax with three median and two lateral black stripes, central stripe faint; tip of scutellum black; black hair on thorax and scutellum, shorter than in ♂. Legs yellowish, femora darker, tips, of tarsi black, all hairs black; abdomen similar to ♂, but more brown. Wings as in ♂.

Length, ♂ 3½-5 mm.; ♀ 5-6 mm.

Holotype and allotype in the Australian Museum.

Hab. Mt. Wellington, Tasmania. Holotype (♂), allotype (♀), 2nd December, 1916. 13 ♂ paratypes, from 25th November to 4th December. 1 ♀ paratype, 31st December, 1917; also a long series in Mr. Clive Cole's collection.

This species occurs near "The Springs" (2,000ft.), where the ♂ can be taken on fallen logs, the ♀ (rare) can be taken by sweeping. The fly appears in quantities for about a fortnight, after which it becomes excessively rare; ♀ ♀ are rare at all times.

Austroleptis multimaculata, sp. nov.

(Pl. XXVII., fig. 10.)

♂. Differs from *A. rhyphoides* chiefly in the spots of the wings, the entirely black abdomen, darker legs, and finally the hairs on face, thorax, and abdomen are lighter.

Wings. Costal cell with one spot at basal cross vein, one at half length, and the apical quarter is suffused black; apical half of marginal cell suffused black; spots in submarginal at base, middle and three quarters length; second submarginal cell spots at base, quarter, middle, and three quarters; 1st posterior with spot at base; followed by six others; 2nd, 3rd, and 4th posterior cells have two spots each; auxiliary cell with three spots; discal cell with two spots; there are indications of other spots more or less present. The veins between the 2nd and 3rd posterior and discal cells, between discal and basal cells, between fourth posterior, 2nd basal, and anal cells, suffused black.

Length, 3½ mm.

Holotype in the Australian Museum.

Hab. Tasmania:—Cradle Mt., 1 specimen, ♂, 22nd Jan., 1917.

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ILLUSTRATIONS.

Fig. 1. Antennæ of *Clesthenia aberrans*, White. ♂.

Fig. 2. Antennæ of *Atherimorpha vernalis*, White. ♂.

Fig. 3. Antennæ of *Chrysopilus æqualis*, Walker, ♂.

Fig. 4. Abdomen of *Chrysopilus æqualis*, Walker, ♂.

Fig. 5. Abdomen of *Dasyomma dissimilis*, sp. nov. ♂ (the two lower plates at apex of abdomen are exaggerated in the figure).

Fig. 6. Antennæ of *Dasyomma dissimilis*, sp. nov. ♀.

Fig. 7. Wing of *Austroleptis rhyphoides*, sp. nov. ♂ (from a micro-slide prepared by Dr. Tillyard).

Fig. 8. Antennæ of *Austroleptis rhyphoides*, sp. nov. ♂ (as seen *in situ*).

Fig. 9. Antennæ of *Austroleptis rhyphoides*, sp. nov. ♂ (from a micro-slide prepared by Dr. Tillyard).

Fig. 10. Wing of *Austroleptis maculipennis*, sp. nov. ♂ (from the holotype).

NOTES ON TASMANIAN WHALING.

By W. Lodewyk Crowther, D.S.O., M.B.

(Read 10th November, 1919. MSS. in full received 24th December, 1919.)

PRELIMINARY.

During the last twelve months three very interesting communications by Messrs. Scott and Lord have been read before the Society.

These were entitled "Studies of Tasmanian *Cetacea*," and described particularly, some skeletons preserved in the Tasmanian Museum, which had been overlooked for nearly half a century.

Certain of these remains had been presented to the Museum by my grandfather (the late Hon. Dr. W. L. Crowther) about 1866-1871, when he was collecting and forwarding such skeletons both to the British Museum and that of the Royal College of Surgeons, England.

In view of the scientific value of the work thus accomplished by him, I trust I may be pardoned for adding a brief account of his life work, before I pass to the consideration of Whaling proper.

Born in 1817, he arrived in Hobart with his father, William Crowther, M.R.C.S., by the ship "Cumberland" in 1824. His education took place at Norfolk Plains (Longford), which meant walking overland to school and returning in the same way to Hobart Town for his holidays. As a boy he was a very keen naturalist, and on one of these trips between school and home he shot a Tasmanian emu, which, he informed my father, was the only specimen of the same he had ever seen, and which I understand was one of the last remaining in V.D.L. By trapping and shooting he got together a very fine collection of skins of the Fauna of Tasmania, and these, with a large number of live animals and birds, he took with him to England by the ship "Emu" in 1839. On arrival, the collection was purchased by Lord Derby for the Zoological Society, and the proceeds of the sale gave my grandfather his medical education at St. Thomas' Hospital.

Returning to V.D.L. in 1841, he joined the Tasmanian Society, and was one of the thirty-six resident members when it became the Royal Society in 1843. In England he had begun his lifelong friendship with Sir William Flower, the great comparative anatomist, who filled successively the positions of Conservator and Hunterian Professor of the Museum of the Royal College of Surgeons, Director of the Natural History Museum, and President of the Zoological Society. Sir William about 1860 commenced his studies on the "*Cetacea*," and enlisted the aid of my grandfather, who during the late 50's and 60's had a whaling fleet cruising with varying success through the different whaling grounds of Oceania. The latter first sent two skeletons of Orca, which Sir William classfiied as *Orca meridionalis*. (P.Z.S. 1864). Other specimens were sent at intervals for several years to the Museum of the Royal College of Surgeons. They embraced 34 catalogue folios and 8 genera of whales, and included 15 full skeletons. Among others the large adult skeleton of the male Sperm whale which dominates the Museum of the College of Surgeons was forwarded in 1869. In this year my grandfather was awarded the Fellowship of the Royal College of Surgeons and their Gold Honour Medal. I believe the first occasion on which it had been conferred on an Australian. In 1878 he was Premier of the Colony, and died on the 12th of April, 1885. The fortunes of his whaling ships I shall touch on later in my paper.

INTRODUCTION.

I shall not attempt any scientific classifications of the whales met with and taken in Southern waters. The names employed are those used by the Whaling Captains for the various whales they met with while at sea.

They all, however, fall into one of two families:—

(1) MYSTACOCETI, i.e., Whale Bone Whales.

(2) ODONTOCETI, i.e., Tooth Whales.

ODONTOCETI.

"*Sperm Whale*" (*Physeter macrocephalus*). This will be dealt with fully under deep sea whaling. Ranging through the Southern Ocean and up to 80 feet in length the adult gave on an average 9 tuns of Oil. One taken by the "Marengo" gave 15½ tuns, valued at £1,500, and another taken by the "Elizabeth Jane" off the S.W. Cape, 13 tuns. The oil a clear amber colour, one-third of which came from the head.

"Black Fish" (*Globicephalus melas*). Pilot or Caaing whale. Not as a rule more than 20 feet in length, and giving 2 - 3 barrels of dark oil.

"Killers" (*Orca gladiator*), giving a clear oil. The only whale whose oil mixes, and is indistinguishable from that of the Sperm whale. Being both fierce and active, these whales were as a rule not molested by the boat's crews.

MYSTACOCETI.

"The Right" or "Southern Black" (*Balæna australis*) like the Sperm ranges very widely through the Pacific Ocean. In size up to 80 feet in length and gives 8 - 9 tuns of black oil from the blubber and tongue. The "Baleen" or Whale bone is a very valuable product from this whale, and as much as 5 cwt has been taken from a large "fish." From June to November Right whales used to frequent certain coasts and inlets to calve, and were taken by the Bay whalers. To this date at Twofold Bay and Norfolk Island such Bay Whaling Stations exist.

"Hump Back" (*Megaptera longimana*) gave short whalebone and 6 - 7 tuns of poor black oil. A deep sea whale which, though pursued by the American and Sydney ships, was not sought after by those of Hobart Town.

"Fin Back" (*Balænoptera*), frequently sighted from the ships, gave both whale bone and black oil, but, being difficult to approach and fasten to, was not usually pursued.

"Sulphur Bottom (*Balænoptera australis*). A Black Whale which gave black oil and bone. Not as a rule worth taking.

"Grampus" and *"Cow Fish,"* with other members of the Dolphin tribe, were terms applied loosely, and probably should be classed under the *Odontoceti*.

The oil taken was either:—

(1) Clear Amber colour, as from the "Sperm" and "killer."

(2) Black or Southern Oil from the "Right" whale, "Humpback," etc.

Both darker in colour and less valuable than that of the "Sperm" whale.

In ships from Hobart Town the "take" of oil was always measured by the "Tun," in American ships by the "Barrel."

The Royal Kalendar for 1849 states:—1 Tun = 8 barrels = 252 gals.

Whale Bone or "Baleen": from the mouth of the "Right" and other Black Whales, was a valuable product, and up to 5 cwt. was taken from that of a large whale.

As we divide the whales into two divisions, so also we find two distinct methods of whaling.

It was the habit of the "Right" whales in the winter months to come to the coasts of New Zealand and Australia to calve and feed. Some Bays were more favoured than others, and on these, shore establishments were fitted out for "Bay Whaling." Such places in the early decades of last century were Cloudy Bay, Foveaux Straits in New Zealand, and the East Coast of Tasmania, etc.

The "Sperm" whale, on the other hand, kept to the open sea in pursuit of his food, the "squid," and to take the Cachalot, ships were fitted out for lengthy cruises on the high seas.

In succession, then, will be considered these two methods of whaling, i.e.,

(1) The Black Whale Fishery ("Bay" whaling).

(2) The Sperm Fishery.

The former was carried out either (a) by a land establishment with boat crews, or (b) by small vessels, cruising around the Coast and Bays of V.D.L. The latter by larger ships fitted out for prolonged cruises on the high seas.

THE BLACK WHALE FISHERY.

It is very difficult to find definite data dealing with the commencement of bay whaling in V.D. Land. It was of a different type from that of New Zealand, where the ships from U.S.A., England, or Australia selected a bay, where they landed their shore parties, the latter doing all their work from the shore stations, and the ship when full returning to its home port.

In V.D.L. it was more the practice for a station to be established at a selected Bay and for the Oil taken to be shipped by a tender to Hobart Town and thence to England. One or more boats' crews were stationed at the establishment, and a lookout posted on a favourable position. On a whale being sighted the crew pulled away, and, if possible, made themselves fast to the whale, killed it, and, often after a very long and laborious tow, brought their catch to the shore. There, there was fitted a rough tripod scaffolding, to the base of which the whale was secured, and by the aid of which the blubber was stripped from the whale and taken on shore to be boiled down. (A most interesting painting of the station at Wineglass Bay, Freycinet's Peninsula, is in the Tasmanian room of the Museum.)

It is very difficult to obtain accurate particulars of the early history of Bay whaling in V.D.L.. The Press of that day gives only a scanty paragraph from time to time, when something of more than ordinary interest is noted. No records are available before 1816, when the Government *Gazette* was first printed, and copies of the earliest papers are not in the Government Archives. From Fenton's History we read that "between 1813-1815, under "Governor Davey, the whale fishery was carried on with "profitable results and a lucrative trade in seal skins from "the Bass Straits Islands was established." Bent, in the *H. T. Gazette* for June 24th, 1816, writes as follows in his local news:—"A great number of whales have already "made their appearance in Frederick Henry Bay, some few "have been seen as high as Sullivan's Cove (i.e., the present "location of the Hobart Wharves). Preparations are being "made by Mr. D. McCarthy and coadjutors to begin the "Fishing." The Editor adds the following:—"The very "elements contribute to our prosperity when industry leads "the way." During this year whales were taken in the Derwent proper.

In 1822 whales were again very numerous around our Southern Coast, and even in the estuary of the Derwent (Fenton).

Between 1820 and 1830, as readers of McNab's works will remember, the coasts of New Zealand were constantly visited by whaling ships from England, France, and U.S.A. (particularly the latter). These ships, observing the regular winter arrival of the "Right" whales, to favoured Bays and Inlets, gradually relinquished the deep-sea pursuit of the "Sperm" whale for the easier takings of the "Right" whales off these Bays. This whaling was done at first from the ship, which lay at anchor, and sent her boats' crews away in pursuit, the whale when captured being towed back to the ship and "tried out" on board. From this method was evolved the shore station proper, with the parties landed and living there, and trying-out their catch on shore.

Maori villages sprang up adjacent to the tents and supplied labour, food, and crews for the boats. This cosmopolitan gathering of whalers was made possible by the fact that New Zealand was "No Man's Land" and not annexed to the Crown, and in a chosen locality as Cloudy Bay ships from Salem, Bristol, Le Havre, and Sydney lay together for months taking their catch and often assisting each other. V.D.L. being a Crown possession, as such, gave no facilities for ships or crews other than British, except for re-fitting and re-victualling. Oil taken in American and foreign ships paid a duty in England of £26 12s. per tun Imperial, whereas the duty on British Oil was 1s. per tun Imperial. The following certificate had to accompany the Oil, and was required upon the entry at the Customs House, London.

> "*V.D.L.* This is to certify to all whom it may "concern that the oath required by the Act of Geo. "IV. C. 69, sec. 25, has been made before me (describe "here the person administering the oath) by A.B., "shipper of casks of Oil by the "British ship for London. That the same "was bona fide the produce of fish, of creatures living "in the sea actually caught and taken wholly by His "Majesty's subjects, carrying on the Fishery from here "and actually residing in this Colony. (*H. T. Gazette*, "August 13th, 1825)."

The discrimination was even greater with Whalebone, on which foreign ships paid a duty of £95, compared to our ships £1, its value at this date being £160 - £190 per tun.

By this year (1825) the "Derwent Whaling Club" had been formed, its members being:—

James Kelly, Esq.
William Wilson, Esq.
W. Angus Bethune, Esq.
C. Ross Nairne, Esq.

A prize of 8 dollars was given to the first person giving information as to a whale being in the River. Profits were divided into 7 shares, 4 to the Members, 1 to Charitable purposes, and 1 to the Native youth who displayed the greatest expertness as a headsman.

In the *Gazette*, August 13th, 1825, appears the following, which seems to show that the quantity of the train oil from V.D.L. did not compare too favourably with that from other sources:—

"The Southern Whale and Sea horse oil imported from "V.D.L. is generally found to be of dark colour and of less "value than that oil which is paler, from its burning quality "being impaired; this is chiefly owing to want of care in "the boiling of the blubber. The method in use on board "the British South Seamen for producing the oil of good "colour and quality is mainly to keep the contents of the "boiler stirred with a pole, to the end of which is attached "a chain about 20 inches in length. This prevents the "dregs from burning to the bottom of the boiler, and which "precaution, if neglected, will eventually cause the oil to "become dark and of a heavy consistency."

In this year, 1825, although no Hobart Town Ships had departed for the South Sea Fishery, the intermediate step had been taken between it and Bay Whaling; that is to say, local vessels had commenced to take the whales around our coasts and inlets.

The Schooner "Sally" (Capt. Lovett), owner Capt. J. M. Wilson, sailed on July 9th for a Whaling cruise in D'Entrecasteaux Channel; 12 days later news came that she had already taken 2 whales. On August 21st the *Hobart Town Gazette* reports among the arrivals "The "Schooner 'Sally' from D Entrecasteaux Channel with oil, "as she was in the Harbour on Wednesday morning, she "heeled and filled with water immediately, she has since "been got up."

Evidently the ship was none the worse, as on October 13th the "Sally" is reported as leaving under Capt. Lovett with 17 men on a sealing cruise to New Zealand. Melville (Ed. *Colonial Times*) in a retrospect writes as follows on the rise of our Bay whaling:—

"Another invaluable asset to the Colony, as an export, "is oil, and which is referred particularly to, both by the "circumstances that attend its acquisition, and by its being "a branch of a trade not capable of being over done. It "may be remarked that the situation of the Island and the "numerous nooks or Bays with which it abounds, render "it such a place of resort for whales throughout the winter, "that the equipment of a few boats, and the erection of "a boiler or two upon shore for rendering down the oil, "are nearly sufficient, as the outfit of what may be con-"sidered with tolerable certainty a profitable enterprise. "The consequence is that each winter, fresh parties, emu-"lating those of longer establishment, fit out whaling ex-"peditions, and the success that has invariably attended "them, is a strong inducement both to them and others, to "return with energy in future seasons.

"Thus almost at our very door and threshold are we "provided with the means of becoming rich with little com- "parative trouble or exertion; and at the same moment "we are rearing up a fine and manly race of native youths, "in a manner that would qualify them to contest the palm "of superiority on the water with the inhabitants of any "existing upon the whole face of the globe. (Melville, *V.D.L. Annual*, 1813).

The oil for export by 1826 was of considerable value in the Infant Colony. The value of it exported in the last quarter of the year was £1,180. (*H. T. Gazette*, 1826) Mr. Meredith, of Great Swan Port, in the same year, is mentioned (*H.T.G.*, 1827) as having taken a whale with blood red blubber, which when boiled down gave Oil of the same colour, also five tons of casks arrived for him in order to bring his Oil to Hobart Town for lading in the "Persian."

The ship "Governor Sorell" during the year is reported as having been wrecked going to Slopen Island to pick up Oil—which indicates a station being situated there (*H.T.G.*, 1826).

The *Gazette* mentions "nearly every Bay and Inlet "around the coast are swarming with whales, particularly "at Circular Head."

The Editor adds that there was some difficulty in obtaining casks for the export of Oil, and also a tending for the Bay Trade to cause neglect of the Sperm Fishery— "which should be the mainstay of the Trade."

The prices of Oil in London for the year were—Sperm £65, Southern £25 per tun.

One other extract from the *Gazette*, dated May 6th, 1825, is of interest, and is given in the Editor's own words: —

"The Whale alluded to in our last as having been seen "up the River as high as New Norfolk, has since been "killed on the beach at that Township above the punt "ferry. It is no less remarkable than evident that this "animal was bewildered, having actually run itself aground "—a circumstance perhaps never before heard of on this "Island.

"It was not a Specimen of the Whales usually caught "in and near the Derwent, but one of that specimens of "fish frequently taken at sea, and known as the 'Fin Back.' "It was 90 feet in length, and will produce a considerable "quantity of Oil."

During the same week a Mr. Innes, an expert harpooner, killed a 4-tun whale off Hobart Town, and the Editor remarks:—"Our river and bays are at this moment full "of whales." An account of a trip to the South Cape taken in this year mentions the whaling station of Messrs. Kelly and Bethune located on Bruny Island, probably at N. Bruny.

By 1830, in addition to local whaling, our H.T. Ships had commenced to sail to the High Seas, and Ross, *H. T. Almanack*, 1830, states that in this year the "Clarence" was despatched to the Whale Fishery. This was the first H. T. Vessel to do this, and one of her officers was the late Captain McArthur (father of Capt. McArthur, the Shipping Master of Hobart). There is no word of the result of her voyage.

On October 2 of this year the Brig Deveron arrived from Cloudy Bay, New Zealand, with 200 tuns of Oil and 20 tons of bone. While there she had the misfortune to lose in a squall six men, including the first and third mates, one of the former being a native of Hobart Town, named Williams.

The value of the Cargo obtained on the six months' voyage was £5,000, and she was owned by Captain Wilson. These two ships are mentioned as Bay Whalers, as their catch was taken off the coast of New Zealand, and not on the high seas. The industry continued to be very successful both locally and at N.Z.

The "Dragon" in 1831 obtained a full catch in N.Z. waters, and in 1833 the same ship, which had been concerned with the Brig Elizabeth of Sydney in the massacre of Maoris, was burned by the natives. Two whales were followed into an inlet, where the crews were massacred and eaten by the Maoris and the ship burned. In the same year the "Marianne" arrived at Hobart Town from New Zealand with the splendid catch of 260 tuns of Oil (100 barrels Sperm) and 15 tons of whalebone. Only 7 months at sea, her cargo was valued at £4,500. The owners were Messrs. Hewitt and Gore. This success led to proposals to form a settlement from Hobart Town on the South Island of New Zealand, but nothing eventuated.

The following extract is of interest, particularly as it shows the rise of Launceston and its importance from the whaling standpoint, by 1834:—

"In this year there were 7 ships and 24 boats employed "in the Black Whale Fishing from Hobart Town, which "caught 207 whales, producing Oil and whalebone to the "value of £14,373.

"From Launceston there were 16 ships and 53 boats "employed, which caught 130 whales and produced Oil and "whalebone to the value of £10,921. At Great Swan Port "there was one ship and four boats employed, which caught "19 whales, value £900, and 50 barrels of Bream, value "£150." (*H. T. Almanack*, Ross, 1835.)

The indication of the great activity of the Launceston ships conveyed by the above is of especial interest, and I hope it may stimulate someone from the Northern City to investigate the whaling history of that harbour.

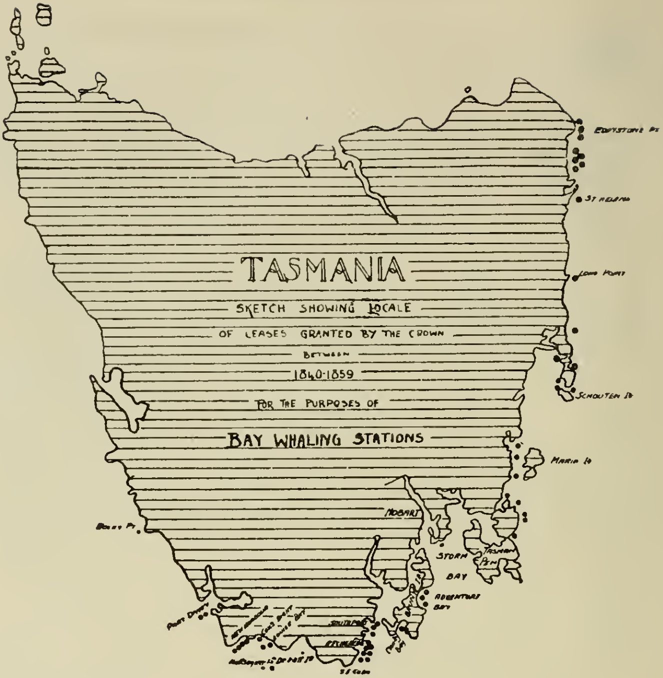
In 1834 the *Hobart Town Courier* (June 13th) states that "Our whaling establishment has, we rejoice to say, "been already more successful than at the same advance "of the season of any former year. By August 15th "Messrs. MacLachlan and Young's establishment had al-"ready caught no less than 60 whales, from which nearly "400 tuns of Oil has been obtained, and other parties have "been proportionately successful." (*H. T. Courier*, August 15th.)

Capt. Kelly on October 17th lost his vessel the "Australian" on Bruny Island.

To give an idea of the value to the Colony of this industry in 1838, the total value of Oil exported for the year was £137,000. compared with £172,000 for wool. (Fenton, *History of Tasmania*, page 9 - 148.)

In 1840 and 1841 there were many applications to the Lands Office to lease areas on various favoured Bays and Inlets. Thirty-five such applications were granted in 1840-41, and six refused. The latter were due for the most part to the fact that such areas were not granted when in the vicinity of Convict or Probation Stations, as at Maria Island and Forestier's Peninsula. Again others were refused owing to no advanced payment of rent. The terms for such leases were not severe, i.e., 3 acres, a frontage on the sea of 3 chains, and for this a yearly rental of 5s. A map is attached showing the approximate locations of these grants. Among those who applied were:—

Capt. Chamberlain.
Ed. and W. Fisher.
Edward Garth.
James Kelly.
Askin Morrison.
Charles Seal.
William Young.
Thomas Lucas.



In 1840 the Bay Whaling had begun to decline—only 13 more leaseholds were granted in the next 18 years. Among the applicants were:—

William Johnstone.	Neal Lewis.
James Kelly.	George Watson.

Owing to the continued pursuit and harrying of the whales, or perhaps for other reasons, the Black whale, after 1841, practically ceased to visit our coast, and Bay Whaling languished. Attention was transferred to the Sperm Whale, which passed our South-Western Coasts from time to time, and vessels were fitted out first to cruise off the S.W. Cape, and later to range over the various whaling grounds of the Pacific.

In the next section the rise and fall of the Sperm Fishing will be considered.

SPERM WHALING.

When considering the Black Whale fishing it will be remembered that, starting with shore stations only, attended with boats' crews and no ships, the industry developed until in 1834 there were many sea-going ships employed around the Tasmanian coast, and occasionally in New Zealand waters. Although primarily fitted out for the Black whaling, naturally if the chance arose the more valuable Sperm whale would be taken.

From the Forties, however, the ships were fitted for Blue Water cruising, with the Sperm as their objective and not the Right whale. Occasional references to the Sperm whaling are found in the early V.D.L. publications, rarely, however, with much detail.

The first ship to have rounded Cape Horn and taken whales in the Pacific appears to have been a ship from New Bedford (U.S.A.) in the year 1790 (Beddoe, *Book of Whales*).

In 1803 the "Albion," with Bowen's expedition on board, took three Sperm whales off the East Coast, and in the succeeding year the "Alexander" took Right whales in the estuary of the Derwent.

In 1816 the English whaler "Adamant" refits at Hobart Town before leaving for the whaling ground. (*H. T. Gazette*, 1816.)

The years between 1816 and 1830, as already shown, were devoted by the Hobart Town ships almost entirely to local *Black* whale fishing. The Editor of the *Gazette* in the issue of September 1st expresses the hope that the profits of this successful year will induce V.D.L. business men to take up the pursuit of the Sperm whale, which he realises to be the mainstay of whaling. (*H. T. Gazette*, September 1st, 1827.)

The tendency to sail oversea from V.D.L. coasts culminated in 1830 with the despatch of the "Clarence" to the Sperm fishing, the first Tasmanian ship to do so. (Ross, *H. T. Almanack*, 1830.)

By 1831 the overseas movement had gained more impetus. Ross states (*H. T. Almanack*, 1831):—"Several "additions have been made to our Colonial shipping during "the past year, and the present spirit for embarking in "the Sperm Whale Fishing is likely to increase still more.

In addition to the "Deveron" already mentioned the following ships are found on the register as having arrived back to Hobart Town during the year:—

January 1st, "Clarence," Capt. Lindsay, from N.Z., Sperm Oil.

January 24th, "Caroline," Capt. Smith, from Whaling voyage, Sperm Oil.

October 22nd, "Caroline," Capt. Smith, from Whaling voyage, Black Oil and whale bone.

December 17th, "Industry," Capt. Griffiths, Bass Straits, Seal Skins.

(Ross, *H. T. Almanack*, 1831.)

Captain Kelly, the first Harbour Master of Hobart Town, in 1832 sailed his ship, the "Venus," to the Islands of the South of New Zealand. Evidently unsuccessful in his quest for Seal Skins, he struck south to Macquarie Island, to find there no Seals, and thence to the Campbell Island grounds. Still without success, he sailed south as far as 72 degrees, eventually reaching Sydney on December 31st, 1832. Without any skins or sea-elephant Oil (R. McNab, *Early Whaling Days.*) The vicissitudes of the H. T. ship "Mary Elizabeth" when captured by Maoris in 1834 have been already alluded to, the Maoris quarrelling over the sharing of the "loot" and enabling the crew to recapture the ship.

Sperm Oil was quoted in this year at £57 a tun, Southern or Black Oil at £19 - £22 a tun, and whale bone £80 - £85. The paper of that date mentions the following ships as being due to return to the port from the South Sea whaling, i.e., "Caroline," "William IV.," "Adelaide, "Hetty," "Penelope" (at Macquarie Island for Seals and sea-elephant Oil, of which not a single barrel was obtained, the Seals having completely disappeared), "Royal William," "The Marianne," and "Lang." (*H. Town Courier*, March 27, 1834.)

Other ships mentioned during the year as discharging Oil were the "Lindsay," "Cheviot," and "Mary Elizabeth." Thus we see by this year whaling both Sperm and Black firmly established, and the year's work most successful and prosperous.

The export of Oil, computed at Colonial prices, was £45,513 for the year, compared with £43,765 for wool; and whalebone accounted for an additional £8,217. This will give an idea of the value of the industry to the Infant Colony. (Ross, *H. T. Almanack*, 1835, p 49.)

The indomitable Capt. Kelly is again noticed in the fore this year, where his small ship, the "Australian," was lost off Bruny Island. (*H. T. Courier*, October 13th, 1834.)

The industry as shown was now on a firm basis, and I do not intend to dwell on the thirties and forties, but to pass on to the "Great Age" of Hobart Town's Sperm

Whaling, viz., 1850-60 and 70. Mention, however, must be made of the “Maria Orr.” This vessel, built at Macquarie Point, 1839, has been claimed as the first Tasmanian whaler to be built and manned out of Hobart Town. Her career was not a long one. About 1841 she was bought by Charles Seal, Esq., of Hobart Town, and a little later wrecked off the Acteon Reef, and became a total loss. Captain McArthur, who was in command, then returned to England, and brought out the “Aladdin for Mr. Seal, and commanded her for several cruises.

As showing the extent of whaling by 1847, on Good Friday of that year there were no less than 37 whalers anchored in the Derwent refitting, the bulk of them being American.

In 1850 the great prosperity of Tasmanian Sperm whaling had commenced. Hobart Town was building its own vessels, and, more than that, manning them with seamen of the first quality. Whaling had cast its spell over the community, and there was no lack of either money to fit out the ships, or of men to man and sail them. The crew signed on according to the “Lay” or Share of the catch, which was proportional to the amount of Oil taken.

Mr. R. R. Rex has a copy of such an agreement, which is here given:—

ARTICLES of AGREEMENT made at Hobart Town in Van Diemen's Land BETWEEN George Chase of the first part and the several seamen whose names are hereto subscribed of the second part WHEREAS the several seamen have respectively agreed to engage in the Whale Fishery in the service of the said George Chase for the consideration hereinafter mentioned NOW THESE PRESENTS WITNESS that each of them the several seamen for himself agrees with the said George Chase that in consideration of the Lay or Share hereinafter mentioned and hereunder written opposite to his name he will at such time during the now approaching whaling voyage or voyages as he shall be required proceed in such vessel or boat as the said George Chase may direct to any River Creek or Place on or near the Coast of this Island New Holland New South Wales New Zealand or elsewhere on the High seas as the said George Chase or his agents may require for the purpose of killing and taking whales and trying down the same and obtaining and preserving the Oil and whalebone thereof and that he will continue in the employment of the said George Chase during the whole of the whaling voyage or voyages (or from the first day of September one thousand eight hundred and fifty five and up to and until the thirty first day of August one thousand eight hundred and fifty six if so long required) and each of the several seamen hereby promises that he will diligently and faithfully do his duty by day and by night during the continuance of his term of service under this agreement and obey the lawful commands of the said George Chase or of the officer or officers from time to time appointed over him and that he will take care of all matters and things from time to time committed to his charge and assist in carrying them as he may be required AND it is distinctly agreed that in case any such seaman shall on any pretence unlawfully desert from the service of the said George Chase before the term of service hereby agreed for shall be fully ended he shall forfeit the whole of the said Lay or Share or proportion of Oil and Whale bone and all right to remuneration of any kind under this agreement or otherwise AND it is agreed that absence from the vessel or boats to which any such seaman shall for the time be attached for more than twelve hours without lawful excuse shall be deemed a total desertion and shall render the person so absent liable to such forfeiture AND it is agreed that at the close of the said term of service and as soon as the quantity of Oil and whale bone procured by the said George Chase's whaling vessel to which such seamen shall belong shall have been ascertained and shall be ready for exportation (whether landed at its final port of exportation or not) the said George Chase shall pay to the said seaman for the said Lays or Shares of and in such Oil and whalebone at the rate of Fourteen Pounds for every marketable tun of Black Oil Forty Pounds for every tun of Sperm Oil and Forty Pounds for every ton of clean and marketable whalebone and the said seamen agree to accept the same in payment of such Lays or Shares and in lieu of all wages or other compensation IT BEING UNDERSTOOD NEVERTHELESS that out of such Lays or Shares the said George Chase may deduct all advances previously made to the parties in money clothing stops or tobacco PROVIDED that in every case the seamen shall be bound (if required so to do) to assist in the actual shipment of all such Oil and whalebone or in conveying the same to Hobart Town Launceston (as the case may be) for such shipment and the service under this agreement shall not be deemed completed until such shipment or conveyance (if so required) shall have been effected LASTLY the said George Chase agrees to provide for and supply to each seaman weekly during the said term of service the following provisions and other necessaries of good quality viz. 12 lbs of beef or mutton or ten pounds of pork twelve pounds of bread or flour one and a half pounds of sugar and a quarter of a pound of tea. All extras to be chargeable against the said seamen as in the case of clothes or money. Any wilful or negligent destruction or loss of any of the owner's property or other misconduct on the part of any seaman to the owner's damage may be set off against the Lay or Share or other claim for wages under this agreement. It is agreed that the said George Chase's whaling vessel shall man two boats.

DATED in Hobart Town this first day of September 1855.

(Signed) GEORGE CHASE.

Name.	Capacity.	Lay or Share on Sperm Oil	Lay or Share on Black Oil & Whale Bone.	Witness to Signature.
John M. Luke	Ship Keeper	30th	20th	J. Suter, J.P., 1st Sept , 1855
George Tilley	Boat Steerer & Carpenter	25th	20th	J. Suter, J.P., 1st Sept., 1855
Robert Jeffrey	Boat Steerer	30th	20th	J. Suter, J.P., 1st Sept., 1855
Henry Madge	Seaman	50th	40th	J. Suter, J.P , 1st Sept., 1855
George Cafley (X) Witness, George Hawthorne	Seaman	50th	40th	J. Suter, J.P., 1st Sept., 1855
Thomas Storey (X Witness, Geo. Hawthorne	Seaman	55th	40th	— 3rd Sept., 1853
John Duncan (X) Witness, Geo. Hawthorne	Seaman	55th	40th	G. W. King, J.P., 7th Sept., 1855
Sydney William Ellery	Seaman	55th	10th	G. W. King, J.P., 7th Sept., 1855
George Gillham	Seaman	55th	40th	G. W. King, J.P.. 10th Sept., 1855
Samuel Miles	Cook & Seaman	50th	40th	G. W. King, J.P., 10th Sept., 1855
William Gubby	Seaman	55th	40th	G. W. King, J.P., 10th Sept., 1855
John Scutchings	Seaman	80th	70th	G. W. King, J.P., 10th Sept., 1855
Laurence Millar	Seaman	55th	40th	G. W. King, J.P., 13th Sept., 1855
Alex. Donaldson	Boat Steerer	30th	—	—

A skilful and determined Captain was a priceless asset to any owner, and such a man usually could command the best boat-steerers and crews, in whose interests it was to follow a successful Captain and a lucky ship. The crews after signing on were given an advance of pay, and the ships anchored in mid-stream, and then the difficulty began. The men had to be dragged, often drugged and drunk, from the hotels to the ship, and when all (or sufficient) had been collected, the cruise, which might last two years or over, commenced.

Some of these cruises were short and highly profitable, on others a ship after months and even years at sea might make Hobart Town a "clean ship," i.e., with no oil. An instance of the former was the fitting of the barque "Asia" for sea in 1870. The cost of the ship, fitting, all stores and advances paid to the crew amounted to £6,750 18s. In ten months she had returned to Hobart with 68 tuns of sperm oil at £90 per tun of a total value of £6,120. Endless examples of unsuccessful voyages can also be given.

Among owners and ships during these three decades 1850-60-70 the names of the following owners and ships may be noticed. The list, however, is not intended to be full or complete and only touches lightly the full tally.

Such names include:—

Charles Seal, Esq.,
Prince Regent
Maria Orr (lost 1841)
Aladdin
Sussex
Southern Cross
Pride (Brig)

McGregor Bros.
Flying Childers
Derwent Hunter
Asia
Emily Downing

H. Bayley, Esq.,
Runnymede

—. Johnston, Esq.,
Othello

Dr. W. L. Crowther,
Elizabeth Jane, Schooner, Captain Abbott
Offley, Barque, Captain Robinson
Sapphire, Barque, Captain Sanderson
Velocity, Schooner
Flying Squirrel, Schooner
Isabella, Barque, Captain Chamberlain
A. Sherwin, Esq.,
Marie Laurie
Louisa
Zephyr
Capt. E. Lucas,
Isle of France
H. Hopkins, Esq.,
Nautilus

The "Othello" being perhaps the most consistently lucky and successful ship sailing out of Hobart.

Captain A. B. Robinson, who commanded in succession the "Velocity," "Emily Downing," and "Othello," is living now at Glenorchy, and it is to him I am greatly indebted for much of the information in reference to the Whaling grounds and taking of the Sperm whales.

In 1855, the late John Ross completed his patent slip at Secheron, and Messrs. McGregor also laid down a slip at the Domain Yards. This enabled repairs to be carried out, and gave a tremendous impetus to Hobart Town whaling.

In 1857 the Brig "Grecian" (Chas. Seal, owner) when cruising off the South West Cape "rose" Sperm Whales. The boats were lowered in chase, and that of R. Marney, the chief mate, made fast to one. The whale at once made away, towing the boat after it. Night came on rapidly, and during the darkness flares were lit from the "Grecian" and guns let off. However, no trace was ever again found of the boat or its crew.

In the same year the late Dr. W. L. Crowther fitted out an expedition to take Sea elephant oil from Kerguelen Island (Desolation Land). The "Offley" (barque), Capt. J. W. Robinson, sailed for her destination, Christmas Harbour, Kerguelen Island, with shore parties on board and fitted out at great expense. The sea elephants were to be taken from Hurd's Island, which had no Harbour, and only one open roadstead. For the expedition to be successful a tender to land the shore parties and supplies, and to bring off the barrels of oil to the larger ship was essential. The Schooner "Elizabeth Jane" was despatched to the rendezvous at Christmas Harbour for this purpose. The "Offley" made the Harbour in good time and waited for her tender. The latter, meeting heavy weather, leaked a little, and, putting into Mauritius, was condemned and sold. To take her place the "Flying Squirrel" (schooner) was at once fitted out and despatched; the crew, however, mutinied and returned to Hobart. By this time the "Offley," after months of delay, had "mated" with the "Mary Powell," an American Schooner, landed her shore party at Hurd's Island and collected much oil. Eventually when 400 tuns had been got on the "Mary Powell," a sudden storm arose, the ship was driven on shore, and the crew were only saved by a miracle. The "Offley," with 100 tuns on board, then returned to Hobart Town, and the venture financially was a very big loss to my grandfather.

On the other hand, the "Elizabeth Jane," a small schooner and two boat ship, had in a short cruise of a few weeks off the South West Cape, some years previously, returned to port with £2,600 worth of Sperm oil.

Dwelling as I have on the voyages of individual ships, I have neglected to write of the pursuit of the Sperm

Whale itself. The Whale was found particularly in the neighbourhood of the S.W. Cape as it passed East and West in its pursuit of the "Squid." The smaller ships from Hobart Town cruised off the Cape and towed the Whales they secured into Port Davey or Recherche to "try" them out. The larger ships passed by way of the South West Cape to the various whaling grounds, i.e.—

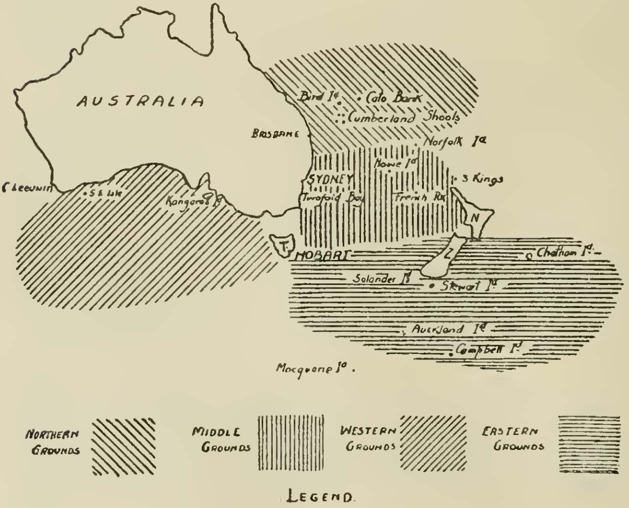
Middle Grounds—Which lay between Sydney and New Zealand and South of Norfolk Island. The famous "Three Kings" and French Rock lay within the Middle Grounds.

Northern Grounds—Which were north of Norfolk Island and between the Australian Coast and New Caledonia. These included Cato's Banks, Woodlark Island, St. Christoval's, and the Cumberland Shoals.

Western Grounds—From South West Cape to the Leeuwin, and including Kangaroo Island, South East Island, Portlock's Reef, and Grindley's Island (at West and East end of Great Australian Bight).

Eastern Grounds—The Solanders, west of Foveaux Straits, and Chatham Islands (in whaling times the Pyramid).

DIAGRAM OF WHALING GROUNDS
OF HOBART-TOWN SHIPS
Circa 1850-60-70



W.L.Crowther 5.12.19

A Diagram attached illustrates these various grounds. The Captains of the ship worked as a rule from ground to ground. In a log of the "Othello," Capt. A. B. Robinson, every one of the four was visited in turn, resulting in an excellent catch.

In the ship's log entries were made of all whales seen from the masthead, with special notes for Sperm.

One reads from day to day of the following having been sighted:—Sperm, Humpback, Finback, Sulphur bottom, Black Fish, Killers, Grampus, Cow fish, and Sunfish. The two first named only were pursued by the Tasmanian ships.

The Sperm whales moved singly or in "pods," i.e., groups of two or three with Bulls on the outside. The Sperm whale was approached very quietly from behind, and made fast by one or more lances being darted into him. Once fast more were secured to the whale until it was dead. The Boat's steerer who "darted" the lances endeavoured to make fast well forward and to avoid hitting a rib. If not secured in a vital spot the whale either sounded or ran, and in the former case might go so deeply as to take all the lines and then be lost. Bombs from guns were used as well as lances, in order to kill the whale.

The Right whale was approached head to head by the boat's crew. Once killed the boat's crew waited for the ship to run down to them and make fast to the whale, and the "cutting-in" commenced. The first stage was to remove the whale's head and get it on board. This was done, because in the Sperm whale one third of the total quantity of Oil is found in the head. The latter consisted of two parts—the "Case" and the "Junk."

The "Case" contained the clear oil and head matter. This was called the "Spermaceti" (Spermatozoa of the Whale) under misapprehension as to its function. It was contained in a boney cavity outside the cranium proper. The oil from the case is a clear amber colour and amounts to one third of the total from the whale. A hole was cut into the cavity and the oil bailed direct into barrels placed for that purpose on either side of the gangway. From these barrels it was taken to the "Try Works" and used later to commence the process of trying out.

The "Junk." The remaining portion of the head contained a large amount of Oil in its cellular tissues, which was comparable to Honey in the Comb. This substance the Sailors called "white horse." The Junk when cut up was taken at once to the blubber room to prevent the loss of its Oil, its own weight causing it to ooze from the tissues.

The "Body." After the removal of the head the Body was treated and the blubber removed as follows:—Hooks were lowered from a yard and secured in the blubber. On traction being made men with sharp spades cut long strips from the body. These "Blanket pieces," a couple of feet in breadth, when five to six feet long, were cut off and hove into the blubber room, and there divided into much smaller pieces. These small pieces were then taken to the Mincer near the "Try Works" and then when the Oil in the pot was heated, thrown in, and boiled down. When boiled the oil was bailed out into "Coolers" on either side of the Try Works, thence to the tanks, and from the tanks to casks and stowed below.

For the above description of "Trying-out" a Sperm whale I again have to thank Captain A. B. Robinson.

During this year the Australian and New Zealand whaling grounds were populous with ships, particularly in well known whaling localities. Every Captain logged any whaler spoken to, giving his catch and time at sea, and this information was published on his return to port, and so the public were given some idea of the fortunes of the ships still at sea.

The following entry in the "Othello" log for Saturday, November 20th, 1869, gives some idea of the number of ships in the neighbourhood of Norfolk Island:—"Light "Easterly and variable winds—at 9.30, and we ran off shore "to the West." The following named ships are either at the Island or have been here very lately. I give the report as furnished by Mr. Fred. Young of N.Z.

B.k. Hunter, Captain Chase, 23 months; 1,650 barrels of Sperm.

B.k. The Ionia, Captain Norton, 30 months; 500 barrels of Sperm, 600 Black Oil.

B.k. Highland Mary, Captain French, a long time; 15 barrels of Sperm.

Abraham Barker, 36 months; 2,900 barrels of Sperm.

Corral, Captain Potter, 15 months; 500 barrels of Sperm, 1,000 Black Oil.

Northern Light, Captain Baker, 1,200 barrels of Sperm, 450 Black Oil.

Napoleon, 17 months; 750 barrels of Sperm.

Petrel, Captain Worth, 40 months; 1,100 barrels of Sperm.

Europa, Captain Rye, 24 months; 900 barrels of Sperm, 800 Black Oil.

Onward, Captain Allen, 8 months; 180 barrels of Sperm, 25 Black Oil.

Fanny Fisher, Captain Mayhew, 1 month; clean.

The American ships away 2 - 3 years from Salem or New Bedford carried little or no money. It was their custom to pay for fresh food and stores with American Agricultural Implements, as ploughs, etc., in this way helping the trade of U.S.A.

In 1870 Sperm Oil was £120 a tun, causing a revival in the trade, which had been on the decline for a few years.

After 1886 the trade fell away until only the "Waterwitch" was left. An attempt was made in 1893 to revive the industry, and the barque "Helen" was fitted out. She went to the Campbell Islands, where the Black whale was said to have its quarters, but the venture was not a financial success.

In writing the latter part of these notes I have received the greater part of information from gentlemen who have been interested in or connected with the old whaling fleets. Particularly I wish to thank my father (Dr. E. L. Crowther), Captain A. B. Robinson, R. R. Rex, Esq., A. C. Hume, Esq., and Captain McArthur for their assistance and great help.

ABSTRACT OF PROCEEDINGS

1919

Annual Meeting.

The Annual General Meeting was held at the Museum on 10th March.

Mr. L. Rodway, C.M.G. occupied the chair.

The Annual Report and Statement of Accounts were read and adopted.

There being 11 nominations for 9 vacancies on the Council, an election was held, the following being elected as the Council for 1919:—Dr. A. H. Clarke, Dr. Glasson, Messrs. W. H. Clemes, L. Dechaineux, T. W. Fowler, J. A. Johnson, L. H. Lindon, L. Rodway, C. C. Thorold.

Mr. R. A. Black was appointed Auditor.

The following were elected members of the Society:—Lieut.-Col. R. E. Snowden, Dr. E. A. Elliott, Messrs. W. N. Crawford, G. A. Jackson, Miss F. Stevenson.

Mr. Clive Lord exhibited a specimen of the spotted-tailed Sea Snake (*Hydrus platurus*). This being the first record of this species from Tasmania.

Mr. H. H. Scott (Curator of the Launceston Museum) delivered an interesting lecturette upon certain osteological features of Tasmanian Cetacea.

Illustrated Lecture.

Mr. E. T. Emmett (Director of the Tourist Bureau) delivered an illustrated lecture on "The River Gordon and the West Coast of Tasmania."

Conversazione.

After the business of the meeting was concluded, an adjournment was made to the Art Gallery, where a conversazione was held.

14th April, 1919.

The Monthly Meeting was held at the Society's Room, Museum, at 8 p.m., His Excellency Sir Francis Newdegate, K.C.M.G., presiding.

The following members were elected:—Mrs. G. O. Smith, Messrs. G. O. Smith, A. D. Chapman, W. E. Masters.

Papers.

The following papers were read:—

1. "Studies of Tasmanian Cetacea. Part I." *Orca gladiator*, *Pseudorca crassidens*, *Globicephalus melas*, by H. H. Scott and C. E. Lord.
2. "The Geology of Wineglass Bay," by W. H. Clemes.

Illustrated Lecture.

Mr. Walter H. Cummins, A.I.A.C., delivered an illustrated lecture on "The Newspaper World."

12TH MAY, 1919.

The Monthly Meeting was held at the Society's Room, Museum, at 8 p.m.

Mr. L. Rodway presiding.

The following members were elected:—Captain Riggall, D.S.O., Messrs. Charles Burbury, Gerald Burbury, T. J. Burbury, Robert Headlam, and Charles F. Pitt.

Mr. Clive Lord exhibited a series of ornithological specimens.

Mr. T. W. Fowler delivered an illustrated lecture entitled, "Notes on Irrigation."

10TH JUNE, 1919.

Special Meeting.

A Special Meeting of the Society was held at 8 p.m. The object of the meeting was to consider the following additions to the Rules which had been recommended by the Council.

> "55 b. The Council may, at its discretion, upon "the receipt of a request from a sufficient number of "members resident in any district, create a local as"sociation of members of the Society in such district, "and the Council shall also have power to dissolve "such local association at any time after it has been "formed."
>
> "55 c. Every such association shall be carried "on in accordance with rules and regulations to be "laid down from time to time by the Council."
>
> "55 d. The Council may, at its discretion, con"tribute towards the expenses of any local association "in any year a sum not exceeding one-third of the "subscriptions received during such year from mem"bers who are also members of such local associa"tion."

The Chairman, Mr. Rodway, briefly explained the object of the new rules, and after a short discussion the rules as recommended were unanimously adopted.

10th June, 1919.

General Meeting.

The Monthly Meeting was held at the Museum at 8.15 p.m., Mr. L. Rodway, C.M.G., presiding.

The Secretary tabled a file of correspondence received from Mr. L. A. Evans, relating to a supposed tunnel at the River Gordon.

Illustrated Lecture.

Mr. Rodway delivered an illustrated lecture on "Tasmanian Fungi."

14th July, 1919.

The Monthly Meeting was held at the Museum at 8 p.m., His Excellency Sir Francis Newdegate, K.C.M.G., presiding.

Papers.

1. "The Geology of Maria Island," by W. H. Clemes, B.A., B.Sc.
2. "Studies of Tasmanian Cetacea, Part II.," by H. H. Scott and C. E. Lord.
3. "The Early History of Maria Island," by C. E. Lord.

Illustrated Lecture.

An illustrated lecture on Maria Island was given by Messrs. Clemes and Lord.

11th August, 1919.

The Monthly Meeting was held at the Museum at 8 p.m., Mr. L. Rodway presiding.

Member.

Mr. A. N. Lewis was elected a member of the Club.

Papers.

1. "Additions to Tasmanian Mollusca," by W. L. May.
2. "Revision of Professor Haswell's types of Australian Pycnogonidæ," by Professor Flynn.
3. "Notes on a rare Tasmanian Crustacean," by Professor Chilton.

Illustrated Lecture.

Mr. Rodway delivered an illustrated lecture on Tasmanian Cordyceps.

SEPTEMBER AND OCTOBER.

Owing to the influenza epidemic it was impossible to hold the usual meetings of the Society during September and October. A meeting of the Council was held on 1st September, at which several papers were read.

10TH NOVEMBER, 1919.

The Monthly Meeting was held at the Museum at 8 p.m., Mr. L. Rodway presiding.

Before the business of the meeting was proceeded with, reference was made to the severe loss that the Society had sustained owing to the death of Mr. W. H. Twelvetrees, Government Geologist of Tasmania.

Mr. Lord drew attention to the fact that the English Blackbird had been found nesting in Tasmania. He suggested that steps should be taken to prevent this species becoming a pest to fruitgrowers. It was resolved to write to the Government concerning the matter.

Lecture.

Dr. W. L. Crowther delivered an instructive lecture on Tasmanian Whaling.

15TH DECEMBER, 1919.

A meeting was held at the Museum at 4.30 p.m.

The following members were elected:—

Rt. Rev. R. S. Hay, Bishop of Tasmania, Messrs. J. R. Irby, H. Warlow-Davies, T. H. Leahy, A. D. Mackay, and T. H. Williams.

ANNUAL REPORT

The Royal Society of Tasmania

1919

Patron:

HIS MAJESTY THE KING.

President:

HIS EXCELLENCY SIR FRANCIS NEWDEGATE, K.C.M.G.,
GOVERNOR OF TASMANIA.

Vice-Presidents:

E. L. PIESSE, B.Sc., LL.B.
L. RODWAY, C.M.G.

Council:

(Elected March, 1919).

A. H. CLARKE, M.R.C.S., L.R.C.P. *(Chairman)*
W. H. CLEMES, B.A., B.Sc.
W. E. L. CROWTHER, D.S.O., M.B. (elected August, 1919)
L. DECHAINEUX
T. W. FOWLER
J. L. GLASSON, M.A., D.Sc.
J. A. JOHNSON, M.A.
L. H. LINDON, M.A. (resigned, July, 1919)
L. RODWAY, C.M.G.
C. C. THOROLD, M.A.

Hon. Treasurer:

L. RODWAY.

Auditor:

R. A. BLACK.

Secretary and Librarian:

CLIVE E. LORD

LIST OF MEMBERS.

Honorary Members:

David, T. W. Edgeworth, C.M.G., B.A., F.R.S., F.G.S. Professor of Geology and Physical Geography in the University of Sydney. The University, Sydney.

Mawson, Sir Douglas, B.E., D.Sc. Adelaide.

Shackleton, Sir Ernest H., Kt., C.V.O., F.R.G.S., F.R.A.S. 9 Regent-street, London, S.W., England.

Spencer, Sir W. Baldwin, K.C.M.G., M.A., F.R.S. Melbourne.

Ordinary, Life, and Corresponding Members:

"C," Corresponding Member.
"L," Member who has compounded subscriptions for life.
*, Member who has contributed a Paper read before the Society.
†, Member who has been elected a member of the Council.

Year of Election.		
1916		Ansell, M. M., B.A. The Registrar. The University, Hobart.
1918	L	Avery, J. Electrolytic Zinc Co. Risdon.
1908	L	Baker, Henry D. C/o American Consulate, Hobart.
1887		Barclay, David. 143 Hampden Road, Hobart.
1890		*Beattie, J. W. 1 Mount Stuart Road, Hobart.
1918		Bellamy, Herbert. City Engineer. Town Hall, Hobart.
1901	C	Benham, W. B., M.A., D.Sc., F.R.S., F.Z.S. Professor of Biology, University of Otago. Dunedin, New Zealand.
1903		Bennett, W. H. "Ashby," Ross.
1918		Bennett, A. E. "Ashby," Ross.
1900		Bennison, Thomas. 29 Cromwell Street, Hobart.
1918		Bennison, E. A. Napoleon Street. Battery Point.
1918		Bisdee, E. O. Lovely Banks, Melton Mowbray.
1912		*Black, R. A. Chief Clerk, Department of Agriculture. 50 High Street, Queenborough.
1909		*Blackman, A. E. Franklin.
1918		Bowling, J. "Clovelly," Risdon Road.
1892	C	Bragg, W. H., M.A., F.R.S. Professor of Physics in University College, London.

Year of Election.		
1917		Brettingham-Moore, Dr E., M.B., Ch.M. Macquarie-street, Hobart.
1911		Brooks, G. V. Director of Education. Education Department, Hobart.
1907		Brownell, F. L. "Leura," Main Road, Moonah.
1918		Bryer, J. R. Taroona.
1918		Burbury, Alfred. "Glen Morey," Antill Ponds.
1919		Burbury, Charles. "Inglewood," Andover.
1918		Burbury, Frederick. "Holly Park," Parattah.
1919		Burbury, Gerald. "Syndal," Ross.
1919		Burbury, T. J. "Park Farm," Jericho.
1909		†*Butler, W. F. D., B.A., M.Sc., LL.B. Bishop Street, New Town.
1917		Butters, J. H. Chief Engineer and Manager State Hydro-Electric Department, Hobart.
1919		Chapman, A. D. 105 Macquarie Street.
1912		Chapman, J. R. Holebrook Place, Hobart.
1901	C	Chapman, R. W., M.A., B.C.E. Elder Professor of Mathematics and Mechanics in the University of Adelaide. The University, Adelaide.
1913		Chepmell, C. H. D. Clerk of the Legislative Council. 23 Swan Street, Hobart.
1896		†*Clarke, A. H., M.R.C.S. L.R.C.P. Macquarie Street, Hobart.
1918		Clarke, T. W. H. Quorn Hall, Campbell Town
1887		†Clemes, Samuel. Principal of Leslie House School. Clare Street, New Town.
1910		†*Clemes, W. H., B.A., B.Sc. Leslie House School, Argyle Street, New Town.
1918		Conlon, A. Agricultural Department, Hobart.
1917		Copland, D. B., M. A. Lecturer in History and Economics, the University, Hobart.
1919		Crawford, R. N. Secretary for Education. Education Department, Hobart.
1917		Cullen, Rev. John. Macquarie Street, Hobart.
1918		*Cummins, W. H., A.I.A.C. Greenlands Avenue, Sandy Bay.
1919		†*Crowther, W. L., D.S.O., M.B. Macquarie Street, Hobart.
1884		Davies, The Hon. C. E., M.L.C. "Lyndhurst," New Town Road, New Town.

Year of Election.		
1919		Davies, H. Warlow-, C.E. "Abermere," Mount Stuart.
1908		†Dechaineux, Lucien. Principal of Technical School, Hobart.
1903		Delany, Most Rev. Patrick. Archbishop of Hobart. 99 Barrack Street, Hobart.
1892	C	Dendy, A., D.Sc., F.R.S., F.L.S. Professor of Zoology in the University of London (King's College). "Vale Lodge," Hampstead, London, N.W.
1916		Downie, W. A. Headmaster, Central School, Hobart.
1919		Elliott, E. A., M.B. Macquarie Street.
1918		Ellis, F. Education Department, Hobart.
1919		Erwin, H. D., B.A. Christ's College, Hobart.
1918		Evans, L. Acting Director of Agriculture, Hobart.
1902		Finlay, W. A. 11 Secheron Road, Hobart.
1918		Finlay, G. W. "Baskerville," Campbell Town.
1918		Fletcher, C. E. Education Department, Hobart.
1909		†*Flynn, T. Thomson, B.Sc. Ralston Professor of Biology in the University of Tasmania.
1890	L	Foster, H. D. 137 Hampden Road, Hobart.
1905	L	Foster, J. D. "Fairfield," Epping.
1913		†Fowler, T. W., M.Inst.C.E. Clare Street, New Town.
1918		Gatenby, R. L. Campbell Town.
1908		†*Giblin, Major L. F., D.S.O., B.A. Government Statistician, Davey Street.
1918		Gillett, Henry. "Wetmore," Ross.
1913		†*Glasson, J. L., M.A., D.Sc. Lecturer in Physics in the University of Tasmania. The University, Hobart.
1907		Gould, Robert. Longford.
1918		Gould, J. W. Tramway Department, Hobart.
1905	L	Grant, C. W. "High Peak," Huon Road.
1913		* Hardy, G. H. Hurlstone. C/o Australian Museum, Sydney.
1918		Harrap, Lieut-Colonel G. E. Launceston.
1898		Harrison, M. W. Glenorchy.

Year of Election.		
1893		Harvey, W. A., M.B. 154 Macquarie Street, Hobart.
1902	C	Haswell, William, M.A., D.Sc.. F.R.S., F.L.S. Challis Professor of Biology in the University of Sydney. The University, Sydney.
1913		Hawson, Edward. "Remine," 174 Argyle Street, Hobart.
1919		Hay, Rt. Rev R. S. Bishop of Tasmania. Bishopscourt, Hobart.
1919		Headlam, Robert. "Glen Esk," Conara.
1915		Hickman, V. V., B.Sc. Garden Road, Albert Park, Moonah.
1919		Higgins, Dr. P. Campbell Town.
1913		Hills, Loftus, M.Sc. Government Geologist. Launceston.
1914		Hitchcock, W. E. Moina.
1908		Hogg, G. H., M.D., C.M. 37 Brisbane Street, Launceston.
1909		*Hutchison, H. R. 1 Barrack Street, Hobart.
1913		Ife, G. W. R., LL.B. Summerhill Road, Hobart.
1919		Irby, J. R. Conservator of Forests. Lands Department, Hobart.
1898		*Ireland, E. W. J., M.B., C.M. Launceston General Hospital.
1918		Innes, H. S. 71 Davey Street, Hobart.
1919		Jackson, Geo. A. Tregear's Building, Collins Street.
1906		*Johnson, J. A., M.A. Principal of the Philip Smith Training College, Hobart. "Wharepuke," Argyle Street, New Tow
1911		Keene, E. H. D. Tantallon, Tarleton (A.I.F.
1910		Kermode, R. C. "Mona Vale," Ross.
1918		Kermode, Lewis Q., B.A. Birkdale, Lancashire, England.
1905		Kerr, George. 165 Campbell Street, Hobart.
1913		Knight, J. C. E. "Windermere," Claremont.
1918		Knight, C. E. L., B.Sc. Claremont.
1919		Knight, H. W. National Mutual Buildings, Macquarie Street.
1919		Leahy, F. T. Electrolytic Zinc Company, Risdon.
1887		†Lewis, Sir Neil Elliott, K.C.M.G., M.A., B.C.L., LL.B., M.H.A. "Werndee," Augusta Road, New Town.

Year of Election.		
1912		†Lindon, L. H., M.A. "The Lodge," Park Street, Hobart.
1900		Lines, D. H. E., M.B., Ch.B. Archer Street, New Town.
1875	C	Liversidge, Professor Archibald, M.A., LL.D., A.R.S.M., F.R.S., F.I.C., F.C.S., F.G.S., F.R.G.S. "Fieldhead," Coombe Warren, Kingston, Surrey, England.
1913		†*Lord, Clive E. Curator and Secretary of the Tasmanian Museum, Hobart. "Cliveden," Mt. Nelson Road, Sandy Bay.
1912		McAlister, Miss M. K. Rosetta.
1893		*McAulay, Alexander, M.A. Professor of Mathematics in the University of Tasmania. The University, Hobart.
1902	C	Maiden, J. H., I.S.O., F.R.S., F.L.S. Director of Botanic Gardens, Sydney, and Government Botanist of New South Wales. Botanic Gardens, Sydney.
1918		Mansell, A. E. Melton Mowbray.
1918		Martin, Colonel W., V.D. Launceston.
1919		Masters, W. E., B.A., LL.B. Box 22, G.P.O., Hobart.
1913		Mather, J. F. 1 Mount Stuart Road, Hobart.
1917		Mackay, J. H. Professor of Engineering. The University of Tasmania, Hobart.
1919		Mackay, A. D., B.Sc., M.M.E. 4 Fawkner Street, South Yarra, Victoria.
1895		*May, W. L. "Forest Hill," Sandford.
1909		Millen, J. D. Mount Bischoff Mine, Waratah.
1907		Miller, Lindsay S., M.B., Ch.B. 156 Macquarie Street, Hobart.
1894	L	Mitchell, J. G. "Ellesmere," Jericho.
1913		Mitchell, P. H., B.A. Headmaster of the State High School, Hobart. 2 Ashfield Street, Queenborough.
1911		Montgomery, R. B. Davey Street, New Town.
1918		Murdoch, Thomas. Montpelier Road, Hobart.
1882		Nicholas, G. C. "Cawood," Ouse.
1918		Nicholls, Sir Herbert, Kt. Chief Justice of Tasmania. Pillinger Street, Queenborough.
1910		Nicholls, H. Minchin. Government Microbiologist, Department of Agriculture. Macquarie Street, Hobart.

Year of Election.		
1919		Nicolson, Norman. "Streanshalh," Campbell Town.
1917		Oldham, N., J.P. New Town.
1919		Oldmeadow, H. E. R. "Lowes Park," Woodbury.
1908		Parsons, Miss S. R. 190 Davey Street, Hobart.
1902		†*Piesse, E. L., B.Sc., LL.B. 39 Broadway, Camberwell, Victoria.
1910		Pillinger, James. 4 Fitzroy Crescent, Hobart.
1918		Pitt, Frank C. K. "Glen Dhu," The Ouse.
1919		Pitt, C. F. Campbell Town.
1908		Pratt, A. W. Courtney. "Athon," Mt. Stuart Road, Hobart.
1917		Raamsdonk, I. N. Lecturer in Modern Languages, the University, Hobart.
1919		Riggall, Captain A. Hortin, D.S.O. Tunbridge.
1919		Robertson, J. Moore. Sandy Bay.
1918		Robertson, T. W. Box 93, G.P.O., Hobart.
1919		Rowland, E. O. Secretary Public Service Board, Hobart.
1884		†*Rodway, Leonard, C.M.G. Government Botanist of Tasmania. Macquarie Street, Hobart.
1913		Ross, Hector. Sheriff of Tasmania. Elphinstone Road, Hobart.
1915		Ross, J. Head Teacher, New Town School, New Town (A.I.F.).
1896		Scott, R. G., M.B., Ch.M. 172 Macquarie Street, Hobart.
1919		Sharland, A. Campbell Town.
1892	C	*Shirley, John, D.Sc. Principal, Teachers' Training College, Queensland. "Coot-tha," Bowen Hills, Brisbane.
1901		Shoobridge, Canon G. W. 3 Molle Street, Hobart.
1917		Slaytor, C. H., F.I.C. Haxey, Doncaster, England.
1919		Smith, G. O. Town Hall, Hobart.
1919		Smith, G. O., Mrs.
1901	C	Smith, R. Greig-, D.Sc. Linnean Hall, Elizabeth Bay, Sydney.
1919		Snowden, Colonel R. E. "Minallo," West Hobart.
1896	L	*Sprott, Gregory, M.D., C.M. Macquarie Street, Hobart.

Year of Election.		
1919		Stevenson, Miss F. "Leith House," New Town.
1896	L	Sticht, Robert, B.Sc., E.M. Mount Lyell Mining and Railway Co. Ltd., Queen Street, Melbourne.
1913		Susman, Maurice. 88 Murray Street, Hobart.
1907		Tarleton, J. W. 108 High Street, Queenborough.
1887		*Taylor, A. J. Librarian of the Tasmanian Public Library. 28 D'Arcy Street, Hobart.
1918		Taylor, Walter E. Elboden Street, Hobart.
1892	C	*Thomson, G. M., F.L.S. Dunedin, New Zealand.
1918		Thorold, C. C., M.A. Hutchins School, Hobart.
1918		Walch, Percy. King Street, Sandy Bay.
1901	C	Wall, Arnold, M.A. Professor of English Language and Literature in Canterbury College. Christchurch, New Zealand.
1913		Wardman, John. Superintendent of the Botanical Gardens. Botanical Gardens, Hobart.
1918		Waterhouse, G. W., B.A., LL.M. Cantab. Messrs. Ritchie and Parker, Alfred Green and Co., Launceston.
1918		Watt, W. The Observatory, Hobart.
1918		Weber, A. F. Lands Department, Hobart.
1919		Williams, T. H. Electrolytic Zinc Company, Risdon.
1901		Wise, H. J. Lambert Avenue, Sandy Bay.

Members are asked to inform the Secretary of any change of address or other necessary correction.

ANNUAL REPORT.

In accordance with Rule 39, the Council present a report of the Proceedings of the Society for 1919.

The Council and Officers.

The Annual General Meeting was held on the 10th March. Eleven nominations being received for membership of the Council, an election was held, with the result that the following nine members were elected as the Council for 1919:—Dr. A. H. Clarke, Dr. J. L. Glasson, Messrs. W. H. Clemes, L. Dechaineux, T. W. Fowler, J. A. Johnson, L. H. Lindon, L. Rodway, C. C. Thorold.

The Council at the first meeting elected the following officers:—Dr. Clarke (Chairman), Mr. L. Rodway (Hon. Treasurer), Mr. Clive Lord (Secretary and Librarian).

The Council elected Dr. Clarke, Messrs. Clemes. Dechaineux, Johnson, Lindon, and Rodway, to be trustees of the Tasmanian Museum and Botanical Gardens.

During the year Mr. Lindon resigned, and Dr. W. L. Crowther was elected in his place.

Eleven Council meetings were held during the year. the attendance being as follows:—Mr. Rodway 11, Mr. Johnson 10, Mr. Fowler 9, Mr. Clemes 8, Mr. Thorold 8, Dr. Clarke 7, Dr. Glasson 6, Mr. Dechaineux 6, Mr. Lindon (resigned July) 6, Dr. Crowther (elected August) 3

Meetings.

Eight ordinary meetings and one special meeting were held during the year. The outbreak of pneumonic influenza in September and October interfered with the programme of lectures, but notwithstanding this the session, generally speaking, was a successful one. Many instructive papers were read, and the meetings were well attended.

Membership.

It is satisfactory to record a substantial increase in the membership of the Society. The roll at the end of the year showed that there were four honorary members, eleven corresponding members, seven life members, and one hundred and forty-two ordinary members. A number of the new subscriptions do not become due until next year, but when they are received they will add very materially to the financial strength of the Society.

Library.

The Library of the Society now contains over 13,000 volumes, in addition to a large number of pamphlets and other documents. Many of these are of great value, and the upkeep of the Library is becoming an increasing tax on the Society's resources. An extension of the present Library accommodation is becoming a necessity. Owing to the risks of transportation no books have been purchased for several years past with the money derived from the Morton Allport Memorial Fund, but next year it is proposed to acquire a number of volumes with the income obtained from this fund.

Education Section.

Chairman: L. Dechaineux.

Hon. Sec.: W. H. Clemes, B.A., B.Sc.

Owing to the Influenza Epidemic only four meetings of this Section were held. The following papers were read and discussed:—

"The Training of the Emotions and the Will at the Primary Stage," by L. Dechaineux.

"The Training of the Emotions," by J. A. Johnson, M.A.

"The Training of the Will," by S. Clemes.

Obituary.

It is with regret that the Society has to record the death of the following members during the past year:—

H. L. Roberts, of "Beaumaris," Hobart. (Elected a member in 1864.)

W. H. Twelvetrees, of Launceston. Government Geologist of Tasmania. (Elected a member in 1896.)

G. E. Brettingham-Moore, of Hobart. (Elected a member in 1900.)

Donald McKinnon, of "Dalness," Evandale. (Elected a member in 1918.)

John Taylor, of "Winton," Campbell Town. (Elected a member in 1918.)

W. H. TWELVETREES, F.G.S.

W. H. Twelvetrees was born in Bedfordshire, England, in 1848. In 1871 he was employed at the Viskrensensky copper mines and smelting works in Eastern Russia, and remained there for nine years. He was stationed at the

Lidjessie silver mines in Asia Minor from 1882 until 1884. He then became general manager of these mines, and remained in the district until 1891, when he came to Tasmania. He soon began to take an interest in public affairs, and was secretary of the first exhibition at Launceston, which was held in the Albert-hall in 1892. In 1899 he was appointed Government Geologist and Chief Inspector of Mines. He carried out the duties of the combined officers until 1914, when the inspection of mines was made a separate branch of the Mines Department. Since 1914 he held the position of Government Geologist and Director of the Geological Survey of Tasmania, and continued his work practically to the time of his death.

During his regime, the work in his branch of the Department grew in volume and importance. The Geological Gallery, at Launceston, established in connection with the Geological Survey, will always stand as a memorial to his enthusiastic work.

His connection with various scientific societies is well known, and his many valuable contributions in the shape of scientific writings will ever serve to remind geologists and others of his work.

Owing to his death the State has lost a valuable servant, this Society a prominent member, and many of the remaining members have lost a personal friend. Mr. Twelvetrees's kindly nature led him to be honoured and respected by all classes of people, and his loss will be felt far beyond the realm of the scientific world.

ROYAL SOCIETY OF TASMANIA

RECEIPTS AND EXPENDITURE, 1919. GENERAL ACCOUNT.

RECEIPTS.		£ s. d.	PAYMENTS.		£ s. d.
Balance brought forward		20 5 4	Salaries		33 5 0
Subscriptions :—			Papers and Proceedings :—		
Current, 83 at £1/1/-	£87 3 0		1918 (Part)	£61 16 0	
Arrears, 1 at £1/1/-	1 1 0		1919 (Part)	105 13 4	
Advance, 1 at £1/1/-	1 1 0				167 9 4
		89 5 0	Expenses of Meetings		26 5 2
Government Grant in aid of Printing		100 0 0	Library		19 10 11
Miscellaneous...		19 4 9	Light and Fuel		1 14 0
			Lantern and Operator		2 0 0
		£228 15 1	Postages and Petty Cash		8 5 10
Dr. Balance, 1919		50 18 5	Miscellaneous...		18 9 0
			Bank Charges, etc.		2 14 3
		£279 13 6			£279 13 6

MORTON ALLPORT MEMORIAL FUND ACCOUNT,* 1919.

RECEIPTS.		£ s. d.	PAYMENTS.	£ s. d.
Balance brought forward 1st Jan., 1919		39 19 3	Balance to 1920	49 14 3
Interest received from Perpetual Trustee Co.—				
5 per cent. on £200 War Loan	£10 0 0			
Less Trustee Co. Commission	0 5 0			
		9 15 0		
		£49 14 3		£49 14 3

* £200 was raised by Public Subscription in 1878 to establish a Memorial to the late Morton Allport. The Fund was invested in the name of the Perpetual Trustees, Executors, and Agency Co. of Tasmania Ltd., and the income is used for the purchase of Books for the Library of the Society.

Audited and found correct,
R. A. BLACK, Hon. Auditor.
15th Jan., 1920.

L. RODWAY, Hon. Treasurer.
CLIVE LORD, Secretary.
January 7th, 1920.

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